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Take-All Root Rot (TARR)

in St. Augustinegrass Home Lawns of San Angelo and Central West Texas

A cited review of university research on identification, conditions that favor the disease, cultural management, fungicide evidence, and legal-use label facts. It is the full background behind the BES-TEX one-page Take-All Root Rot Best Management Practice (BMP).

About this report	Research review for homeowners who want the full background. Not a BMP, product label, or treatment recommendation: the label on the product in hand is the law.
Geographic focus	San Angelo / Tom Green County and Central West Texas: alkaline, calcareous soils; hard, high-pH irrigation water; hot, dry climate.
Disease	Take-all root rot (TARR) of St. Augustinegrass, historically attributed to Gaeumannomyces graminis var. graminis; Texas isolates now split into G. graminicola, G. arxii and G. floridanus [8].
Source rules applied	Scientific claims: university/extension and peer-reviewed sources only. Product facts: EPA-stamped labels (EPA PPLS) and manufacturer SDS only, kept in Section 6. No manufacturer marketing, forums, or retailer blogs used as evidence.
Date	Research compiled November 11, 2026; public edition November 14, 2026. Labels change: re-check the label in hand before any application.

How to read this report

Numbers in brackets such as [1] point to the university/peer-reviewed bibliography. L-numbers such as [L2] point to EPA-stamped product labels and S-numbers such as [S2] point to Safety Data Sheets. Full URLs are in the bibliography at the end.

Evidence grades used in tables: **A** = peer-reviewed field study on St. Augustinegrass TARR; **B** = peer-reviewed but a different host or setting (bermudagrass greens, bentgrass) or lab-only (in vitro); **C** = extension recommendation, expert synthesis, or non-peer-reviewed university report; **D** = mechanism or inference only.

Where a fact could not be confirmed, the text says so plainly instead of filling it in.

Bottom line (plain English)

Key findings

- **Confirm it first.** TARR looks like several other St. Augustine problems (large/brown patch, chinch bugs, white grubs, iron chlorosis). The tell-tale sign is short, black, rotted roots and stolons that lift easily. A lab diagnosis is available from the Texas Plant Disease Diagnostic Lab ($35 per sample when this report was compiled) [1][7].
- **It is a stress disease of the roots.** The fungus is common in Texas lawns, even healthy-looking ones; disease shows when turf is stressed by alkaline soil, wet or compacted soil, shade, thatch, excess nitrogen, low mowing, heat, drought, or high-sodium water [1][2][15][19].
- **Cultural care is the foundation; every university source agrees** [1][2][12][15][19]. Best supported: fix drainage and overwatering, water deeply and infrequently, mow St. Augustine high, core-aerate and control thatch, fertilize by soil test with moderate nitrogen, use acidifying (ammonium) nitrogen, and do not lime.
- **Peat moss topdressing** (1 bale of 3.8 cu ft sphagnum per 1,000 sq ft; Texas A&M allows 1-2 bales, 1-2 times a year) is the signature Texas A&M recommendation [1][4][5][6]. It comes from Dallas home-lawn field work (2001-2003) with a short peer-reviewed paper, but the full data, the best timing, and performance on West Texas calcareous soils are not published. Grade: C+/B-.
- **Fungicides are preventive helpers, not cures.** Best-supported actives are the strobilurins (azoxystrobin; pyraclostrobin for professionals) and, with more mixed results, the DMI/triazoles (triadimefon, propiconazole, tebuconazole, myclobutanil). Field results on St. Augustine are modest (about 30-35% less disease in one Georgia study) and inconsistent [5][16][21]. Water them in with about ¼-½ inch of water right after application [1][16].
- Homeowner products whose EPA labels list take-all on home lawns include Scotts DiseaseEx and Heritage G (azoxystrobin 0.31% granules) [L1][L2]; BioAdvanced Fungus Control for Lawns Granules II (propiconazole 0.51%) [L4]; Ferti-lome Liquid Systemic Fungicide II / Bonide Infuse Concentrate (propiconazole 1.55%) [L9]; Bonide Infuse Lawn & Landscape granules (thiophanate-methyl 2.08%; lists bermudagrass decline, the same pathogen) [L12]. Caution: the residential directions of the myclobutanil granules (F-Stop, Immunox granules, Fung-Away) do NOT list take-all [L6]. University results for propiconazole on St. Augustine lawns are mixed (Section 5); azoxystrobin has the most consistent support. BES-TEX does not stock every product named in this report; call 325.653.1300 or ask at the counter for what we carry.
- **Timing for San Angelo:** fall applications as soil cools through roughly 86°F to 68°F (estimated mid-September to late October) and spring applications after green-up (labels say April-May; some extension programs start in March) [1][16][20][23][L1][L2]. Local soil-temperature data were not found; use a soil thermometer.

Main uncertainties: no West Texas field trials exist; curative control is poor; propiconazole and other DMIs produced conflicting results; peat moss data are thin; and lowering bulk soil pH is unrealistic on San Angelo's calcareous soils (see Section 8).

1. Purpose, scope, and the pathogen name

This report looks at university studies, and at products whose labels allow use on St. Augustine lawns, for take-all root rot in West Texas. It pulls together the Texas A&M AgriLife Extension guidance (Dr. Young-Ki Jo; AgriLife turfgrass specialists; the Texas Plant Disease Diagnostic Lab), the Dallas peat moss research, peer-reviewed APS and turf-society papers, and extension guidance from LSU, Florida, Georgia, NC State, Kentucky and Utah State. Product facts are taken only from EPA-stamped labels and manufacturer SDSs and are kept in Section 6.

Name and cause. TARR of St. Augustinegrass was first tied to Gaeumannomyces graminis var. graminis by Elliott and colleagues, who isolated it from rotted roots and stolons in Florida and Alabama lawns and fulfilled

Koch's postulates [10]. Texas A&M still uses that name in homeowner publications [1][2]. Newer DNA work on 75 isolates from central and east Texas St. Augustine lawns separated them into three species - G. floridanus, G. arxii, and G. graminicola - and found G. floridanus grew faster at 30°C (86°F) and was more aggressive in a rice-seedling test [8]. Labels still use older names: "take-all patch" (usually G. graminis var. avenae on cool-season grass), "bermudagrass decline" (G. graminis var. graminis), or, on one label, "take-all root rot" [L13]. This naming mismatch matters for the label section.

What this report is not. It does not tell anyone to apply a product. Every application must follow the label in hand. No West Texas (San Angelo-area) TARR trial was found; Texas research cited here is from Dallas lawns [4] [5] and central/east Texas isolates [8][9].

2. Identification

2.1 Symptoms in St. Augustinegrass

What you see	What the university sources say	Cites
Yellowing (chlorosis)	First sign is yellow foliage that later browns and wilts [1]; lower leaves yellow first [19]. Colbaugh calls yellow, chlorotic leaf extensions on St. Augustine the best clue for separating TARR from white grub damage [4].	[1][4][19]
Thinning, irregular patches	Turf thins, leaving brown irregular patches from 1 ft to more than 20 ft across [1][2]; Dallas patches first 1-2 ft, later 5-10 ft, roughly circular but not always [4].	[1][2][4]
Rotted roots and stolons	Roots short, blackened and rotten, so stolons lift easily; nodes may be discolored [1][2]. Stolons/rhizomes may show black lesions and rot [12]. Dark runner hyphae and hyphopodia are visible on roots, stolons and rhizomes under a microscope [12][19].	[1][2][12][19]
Drought-like decline	Damaged roots cannot take up water or nutrients, so plants look drought-stressed [12][17]. By the time leaves show symptoms, roots have been infected at least 2-3 weeks [12].	[12][17]
Final stages	Diseased stolons succumb to summer heat or winter cold, leaving dead patches that do not recover [4].	[4]

2.2 Season

Texas sources describe infection and symptom expression at different times, which explains apparently conflicting statements. AgriLife says symptoms most often appear in spring or early summer as turf comes out of dormancy, but can appear any time the grass is stressed by heat, drought, shade, alkaline soil, or high-sodium water [1][2]. The AgriLife Earth-Wise guide says take-all spreads mainly from fall through spring during cool, moist, mild weather, with dieback showing in hot summer stress [26]. Dallas researchers saw yellow-patch symptoms on 61% of 70 lawns in September 1999 [4][5]. Florida and Louisiana sources describe it as a summer/early-fall, rainy-period disease [12][17], and Georgia lists warm, moist early spring and summer, with warm-to-hot 77-90°F conditions favoring the fungus [19]. NC State reports the pathogens grow best at 77-86°F soil temperature and are active between 68 and 86°F [22][23].

San Angelo reading (inference, grade D): expect infection activity in the mild shoulder seasons (fall and spring) and symptom expression at spring green-up and during summer heat and drought stress. No San Angelo-specific observation data were found.

2.3 How to confirm

- **Field check:** pull up a few stolons at the edge of a yellowing area. TARR roots are short, black, and rotten, and the stolons lift easily [1][2]. With large patch the leaf blades slip out of the sheath easily and the sheath base has a dark, slimy lesion; with TARR the roots are the problem [1].
- **Lab diagnosis:** the Texas Plant Disease Diagnostic Laboratory (College Station) accepts turf samples taken from the transition zone between affected and healthy grass, with leaves, stolons, runners and roots, bagged in a zip-top bag so it is not soaked, sent with Form D-1178. The fee was $35 per sample when this report was compiled; check with the lab for the current fee. Phone 979-321-5390; plantclinic@tamu.edu [7].
- **Why confirm:** AgriLife advises ruling out large patch and chinch bugs first because their treatments differ greatly, and notes a lawn can have chinch bugs and TARR at the same time [1].

2.4 Look-alikes

Problem	How it differs from TARR	Cites
Large patch / brown patch (Rhizoctonia solani)	Circular patches with yellow-orange borders in fall and spring; leaves pull easily from the sheath; slimy dark lesion at leaf base; turf recovers as temperatures rise in spring. TARR: irregular patches, rotted roots.	[1][2][3][6]
Chinch bugs	Fast-spreading irregular patches in sunny, dry areas in hot weather; insects (adults ~3/16 in, black with white wings) float up in a soapy-water drench (1-2 Tbsp dish soap per gallon over 1 sq yd) or a can flotation test; roots present. Threshold cited: 25 bugs/sq ft.	[1][2][3][26]
White grubs (May/June beetle larvae)	Roots are eaten away (missing) rather than rotted and black; turf lifts like a carpet; C-shaped larvae in soil; animals may dig. Check by cutting a 1 sq ft flap.	[2][3][4][26]
Iron chlorosis	Leaves striped green-and-yellow or all yellow, often in alkaline soils with high phosphorus and in cool, wet soil; roots are normal; corrected short-term by foliar iron sulfate or chelate.	[2][26]
Frost injury / drought	Frost: patches appear overnight after cold, camouflage pattern. Drought: general wilting without rotted roots.	[3]

3. Conditions that favor TARR - and what they mean in San Angelo

3.1 San Angelo setting

Federal soil survey descriptions (USDA-NRCS, not a university source; used only for context) of two series with type locations in Tom Green County - Angelo and Rioconcho - describe soils formed in calcareous alluvium derived from limestone that are "violently" or "strongly effervescent" (free lime) and "moderately alkaline" throughout the profile [29][30]. Utah State University Extension explains that in calcareous soils, solid calcium carbonate buffers acidifying amendments, so attempts to lower soil pH long-term generally fail; Utah field experiments from 1995-1999 found acidifying amendments did not effectively lower calcareous soil pH long-term [28]. The Kentucky turf guide likewise notes that calcareous soils or frequent irrigation with high-pH water may counteract the pH-lowering effect of acidifying fertilizers [25]. AgriLife lists high-sodium water as a TARR stressor [1], and its irrigation-water bulletin lists bicarbonate concentration relative to calcium and magnesium among the key irrigation-water quality factors [27]. San Angelo municipal water pH and alkalinity were not available from a primary source for this review; a water test or the city's annual water quality report can provide them.

3.2 Factor-by-factor evidence

Factor	What university research/extension says	Evidence grade	San Angelo relevance
High soil pH	More likely in alkaline soil (pH >7) [2]; LSU: pH above 6.5 favors disease [15]; UGA: infection associated with pH >6.5 in top 4 in; Mn, Fe, Cu, Zn less available as pH rises [19]. Peat moss benefit attributed to acidity (pH 4.4) [4][5]. Older literature on take-all fungi shows aversion to low pH [4].	C (consistent extension consensus; no St. Augustine dose-response trial found)	High. Native soils are calcareous and alkaline [29][30]. Bulk pH change is unrealistic [28]; focus on surface/root-zone microsite acidification (unproven) and avoiding lime.
Excess moisture / poor drainage	Turf areas that stay wet are prone; avoid overwatering [1]. Extended rainfall conducive [15][12]; poorly drained soils favor the fungus [19]. Overwatering aggravates the fungus [13].	C	Moderate. Dry climate, but overwatered irrigated lawns, low spots, and clay soils can stay wet.
Compaction	Listed stress; aerate to relieve [1][6][15][19].	C	Moderate-high on clay loams and high-traffic areas.
Shade	Dallas 2002 survey: more TARR symptoms in heavily shaded areas [4]; shade intensity increased lawns with symptoms in 2001-2003 study [5]. But LSU saw the 2010 outbreak mostly in full sun [16].	B-/C (survey data; conflicting)	Moderate under trees and on north sides of houses.
Thatch	Fungus lives in thatch; reduce if >½ in [1]; >1 in remove by vertical mowing [19]; excess thatch provides favorable environment [15].	C	Moderate; St. Augustine builds thatch with heavy N and water [2].
Excess nitrogen	Too much N encourages thatch and disease vulnerability; max 4 lb N/1,000 sq ft/yr for St. Augustine and ≤1 lb quick-release N per application [1]. Earth-Wise: excessive N seems to promote take-all; avoid urea-based fertilizers [26]. Florida: avoid nitrate and quick-release urea [12].	C. Note: in greenhouse bermudagrass work, LOW N (and urea) gave MORE root necrosis [24] - rate and source both matter.	Relevant; homeowners often over-fertilize.
Low mowing	Improper mowing height is a stressor; mow St. Augustine 2-3 in [1] or 2-4 in, at the highest or one step below highest mower setting [2]; raise mowing height to help recovery [15].	C	High; scalping is common.
Herbicide injury	St. Augustine is sensitive to herbicides; overuse of herbicides is a trigger [12][15][19].	C	Relevant where weed-and-feed products are used.
Heat, drought, high-sodium water	Listed stressors in Texas [1]; LSU tied outbreak to cold winter then hot summer [16].	C	High: hot, dry summers and hard water.

4. Cultural management - evidence review

University sources agree that cultural management comes first because TARR is a stress-triggered, soilborne root disease [1][2][12][15][19]. LSU puts it bluntly: once foliar symptoms are visible, the disease is very difficult to control [15]. Florida says cultural controls are more effective than fungicides once symptoms are seen [12].

Practice	What sources recommend	Evidence and quality
Lower or manage pH (acidify)	Lower pH toward neutral/slightly acidic "if practical." Slowly acidify over years with ammonium sulfate; powdered sulfur 3-5 lb/1,000 sq ft/yr mixed with well-decomposed compost; or sphagnum peat [1]. LSU: target pH 5.5-6.0; do not lime; use slow-release acidifying N [15]. Do not lime TARR lawns [12][13][19].	C. No St. Augustine trial measured TARR vs. sulfur rate. On calcareous soils, free lime neutralizes acid [28], and Kentucky notes calcareous soils or frequent irrigation with high-pH water may counteract acidifying fertilizer [25], so the AgriLife phrase "if practical" applies strongly in San Angelo. Any benefit is more plausibly local (thatch/root-surface) than bulk soil - inference only (D).

Practice	What sources recommend	Evidence and quality
Ammonium sulfate as N source	Use ammonium sulfate but no more than 1 lb N/1,000 sq ft per application; ≤4 lb N/1,000/yr on St. Augustine [1]. Greenhouse study: ammonium sulfate gave significantly less root necrosis than potassium nitrate, calcium nitrate or urea, and N rates ≥18.3 kg/ha/week reduced TARR vs. low N [24]. NC State reports ammonium sulfate or potassium nitrate reduced TARR in its work [23].	B for bermudagrass greenhouse data [24]; C for lawn recommendation [1]. Not tested on St. Augustine lawns. Kentucky advises washing ammonium sulfate off leaves when temperatures will exceed 80ºF to avoid burn [25].
Irrigation	Water deeply and infrequently (6-8 in deep) [1]; irrigate early morning, avoid evening [15][19]; avoid overwatering [1][13]; rain shut-off device recommended in Florida [13].	C (consistent extension advice; no TARR-specific irrigation trial found).
Mowing height	St. Augustine 2-3 in [1]; 2-4 in, highest or one step below highest setting [2]; remove ≤1/3 of leaf per mowing [12][19]; raise height to aid recovery [15]. Taller mowing gives deeper rooting [2].	C. Minor conflict in recommended height (2-3 vs 2-4 in).
Aeration and thatch	Core-aerate; vertical-mow to reduce thatch if >½ in [1] or >1 in [19]; aerify regularly [15]. AgriLife: rental core aerators reach about 3-4 in; watch for caliche rock and irrigation lines [2]. The fungus can be spread farther when infected plant parts are moved by coring, vertical mowing, or transporting turf [19].	C. Note a tension: cultivation relieves compaction and thatch but can move infected roots/stolons to clean areas [19]; clean equipment between yards is a sensible (unstudied) precaution.
Manganese	Rutgers bentgrass study: MnSO4 at 2.25 kg Mn/ha (about 2 lb/acre) applied in April or October reduced take-all patch; higher rates mostly no better [31]. AgriLife: Rutgers research shows Mn can reduce TARR severity but rate/timing not established in Texas [1]. Florida: apply micronutrients, especially Mn, as foliar sulfate forms [12]. UGA: apply MnSO4 if soil or tissue test shows need [19].	B for bentgrass/G. avenae [31]; NOT tested on St. Augustine TARR (NC State says not extensively evaluated on TARR [22]). Grade for St. Augustine: C/D.
Iron	Iron corrects chlorosis in alkaline soil (foliar iron sulfate or chelate; soil-applied iron less effective in alkaline soils) [2][26].	No TARR-specific iron evidence found. Iron helps color/look-alike chlorosis, not proven against the fungus.
Potassium (and Mg)	Florida: balance N with equal K; extra K in late summer/fall [12]. LSU: provide adequate K and Mg [15]. Fertilize by soil test [1][2].	C. No St. Augustine TARR trial isolating K found.
Sanitation / renovation	Fungus spreads mainly through roots/stolons and when infected grass, thatch or soil is moved; not usually by mowers [1][19]. No resistant St. Augustine cultivars known [4][5][19]; UGA notes some coastal Georgia sites replaced St. Augustine with zoysiagrass [19].	C.

4.1 The Texas A&M sphagnum peat moss topdressing recommendation

Item	What is documented	Cites
Rate	1 bale (≈3.8 cu ft) sphagnum peat per 1,000 sq ft; "after exhaustive field testing" this was sufficient and is "the standard recommendation" (the amount a peat spreader applies in two passes) [4]. AgriLife fact sheet allows 1-2 bales per 1,000 sq ft per application, 1-2 applications per year [1]. UGA repeats 1 bale/1,000 sq ft where pH >6.5 [19]. UF county guidance mixes 4 cu ft/1,000 sq ft into the top 2-4 in before re-sodding (Florida sand) [13].	[1][4][13][19]
Duration	Williamson County AgriLife sheet: research at the Dallas station showed 1 bale/1,000 sq ft protected turf for 2 years [6]. Peer-reviewed abstract: effective control during two successive years on residential lawns [5].	[5][6]
Timing	NOT established. Colbaugh wrote that additional research would address the best time to apply [4]. No university source found that tested spring vs. fall timing.	[4]
Mechanism (proposed)	Peat pH 4.4 creates acidic microenvironments on stolons/roots, reducing saprophytic and parasitic activity of the fungus [4][5]. Not directly measured in the material read.	[4][5]

Item	What is documented	Cites
Comparison	Manure and composted manure gave only partial, short-lived control; peat outperformed manure compost [4][5].	[4][5]
Evidence quality	Field studies on Dallas home lawns, 2001-2003; one 5-page peer-reviewed proceedings paper (abstract read) plus a non-peer-reviewed station report with photos but no data tables [4][5]. No replication outside Dallas, no West Texas test, no published effect sizes found. Grade: C+/B-.	[4][5]
West Texas caution (inference)	Dallas soils were not described in the material read. In San Angelo calcareous soils, peat's acidity will be neutralized faster in contact with free lime and alkaline water [27][28]; benefit duration may be shorter than 2 years. This is a reasoned expectation, not a measured result (grade D).	[27][28]

5. Fungicides - university efficacy evidence

This section is university evidence only. Legal use is in Section 6. Several sources warn that fungicides alone do not cure established TARR: Texas A&M says control is inconsistent when treatment starts after symptoms [1]; LSU says none of the readily available homeowner fungicides is particularly effective on established disease by itself [16][17]; Florida says fungicides are best used preventively and are less effective than cultural controls once symptoms appear [12]; Georgia says homeowners should emphasize cultural controls [19].

5.1 Trial and lab data with numbers

Study (setting)	Treatments	Reported result	Grade / limits
Colbaugh et al. 2005 [5] - Dallas, TX residential St. Augustine lawns, 2001-2003	Azoxystrobin; propiconazole; azoxystrobin + propiconazole; peat; manures	Azoxystrobin "successful" after repeated spring and fall applications. Repeated propiconazole gave "no benefit" alone or combined with azoxystrobin. Peat controlled TARR 2 successive years.	A- (St. Augustine lawn field data, but abstract only; no effect sizes read)
Colbaugh, Wei & McAfee 2003 [4] - Dallas lawns	Terraguard (triflumizole) 4-8 oz, Bayleton (triadimefon) 2 oz, Heritage, Banner Maxx; 2.9 L spray per 10 m²	Terraguard and Bayleton gave "good results"; fungicides worked better on shaded lawns than full sun; effectiveness was not uniform across lawns. Rate units (likely per 1,000 sq ft) not stated.	C (non-peer-reviewed report; no data)
Martinez-Espinoza, Gardner & Price 2005 [32] - coastal Georgia St. Augustine home lawns	Azoxystrobin; triadimefon	TARR severity reduced 30% (azoxystrobin) and 35% (triadimefon), as reported secondhand [21].	B- (meeting abstract not read; numbers secondhand)
Zidek & Jo 2022 [9] - 75 Texas St. Augustine isolates (20 counties), lab	Azoxystrobin (QoI) and tebuconazole (DMI), in vitro	EC50 tebuconazole 0.021-0.1 µg/ml (one isolate 0.296); azoxystrobin <0.014-0.399 µg/ml; most isolates sensitive; resistance not prevalent. Authors call for field validation.	B (lab only; no field control measured)
Elliott 1995 [11] - Florida bermudagrass putting green, 3 years	Fenarimol, myclobutanil, propiconazole, tebuconazole, thiophanate-methyl, triadimefon	None improved turf quality over untreated, curative or preventive, at highest labeled rates. Repeated fenarimol, myclobutanil, propiconazole and triadimefon were often associated with significant quality DECLINE; tebuconazole and thiophanate-methyl were not.	B (peer-reviewed; different host, mowing height and era)
Stephens et al. 2024 [20] - NC ultradwarf bermudagrass greens, field + greenhouse	Multiple chemistries and timings	QoI and/or DMI fungicides gave the greatest TARR reduction; applications made at soil temperatures of 77-86°F gave the greatest suppression. NC State: SDHI fungicides least effective in vitro [22].	B (golf greens; abstract read)

5.2 Active-ingredient summary

FRAC groups are from the University of Kentucky PPA-1 and NC State tables [22][25]. Group 11 = QoI/strobilurins (single-site; resistance risk managed by rotation); Group 3 = DMI/triazoles and pyrimidines; Group 1 = MBC/benzimidazoles.

Active ingredient	FRAC	University evidence summary (TARR / related take-all diseases)	Key citations	Grade for St. Augustine TARR
Azoxystrobin	11	Most consistent support. St. Augustine lawn field success with repeated spring + fall use [5]; ~30% severity reduction in Georgia [21][32]; Texas isolates sensitive in vitro [9]. Listed by AgriLife, LSU, UF, UGA [1][12][15][19]. NC State rating +++ (golf) [22]. Not hard on turf in heat, unlike DMIs [1].	[1][5][9][12][15][19][21][22]	A-/B (best supported)
Pyraclostrobin	11	LSU ranks strobilurins (azoxystrobin, pyraclostrobin) above triazoles [16][17]; listed by UF and UGA [12][19]; NC State +++ [22]. No St. Augustine field data found.	[12][16][17][19][22]	C
Fluoxastrobin	11	Kentucky rates "L" (limited data) for bentgrass take-all patch [25]. No TARR data found.	[25]	D
Triadimefon	3	~35% severity reduction in Georgia lawns [21][32]; "good results" in Dallas report [4]; LSU "to a lesser degree" [16]. Repeated use linked to turf quality decline on bermudagrass greens [11]. NC State ++ [22].	[4][11][16][21][22][32]	B-/C (mixed)
Propiconazole	3	Conflicting. Dallas lawns: repeated use gave no benefit alone or with azoxystrobin [5]. LSU: "lesser degree" [16]. NC State +++ (golf) [22]. Repeated use associated with decline on bermudagrass greens [11]. Listed in AgriLife homeowner table [1]. AgriLife: DMIs at high rates in hot weather can stress St. Augustine [1].	[1][5][11][16][22]	C (inconsistent)
Tebuconazole	3	Texas isolates sensitive in vitro [9]; no quality decline on bermudagrass greens (but no improvement) [11]; UGA lists [19]; NC State +++ [22]. No St. Augustine field trial found; no homeowner lawn product identified in this review.	[9][11][19][22]	B-/C
Myclobutanil	3	Listed in older AgriLife, LSU and UF homeowner tables [1][12][15][18], but the current home-lawn (residential) directions of the myclobutanil lawn granules do not list take-all (Section 6.2) [L6]; repeated use associated with decline on bermudagrass greens [11]. No St. Augustine field data found.	[1][11][12][15][18]	C/D
Thiophanate-methyl	1	Listed by AgriLife, LSU, UF, UGA [1][12][15][19]; no improvement but no decline on bermudagrass greens [11]; Kentucky 1.5 for bentgrass take-all patch [25]. NC State: TARR fungi most sensitive to DMI/QoI [22].	[1][11][12][15][19][22][25]	C/D
Fenarimol	3	Repeated use associated with quality decline on bermudagrass greens [11]. No active product found in an EPA PPLS name search (see 6.4).	[11]	D (not a current option)
Metconazole	3	Kentucky "L" for bentgrass take-all patch [25]. No TARR data found.	[25]	D
Triticonazole	3	Only as pyraclostrobin + triticonazole in UGA professional list [19]; Kentucky "L" for that combination [25].	[19][25]	D
Azoxystrobin + propiconazole	11+3	NC State ++++ (golf) [22]; Kentucky 3.5 for bentgrass take-all patch [25]; but in Dallas lawns adding propiconazole gave no benefit over azoxystrobin [5].	[5][22][25]	C

5.3 Application timing and watering-in (university guidance)

- **Preventive, spring and fall.** AgriLife: best times are spring and fall; fungicides are best used before symptoms develop [1]. LSU: two applications in fall (mid- to late September and mid- to late October) and one in mid- to late March, more if needed [16][17]. Florida: apply at least one month before symptoms usually appear and

continue monthly while weather favors disease [12]. UF Okaloosa County: alternate products; do not use the same product in spring and fall of the same year [13].

- **Soil-temperature triggers (golf research, transferable with caution).** Begin when soil temperatures fall to about 86°F in late summer/early fall and continue every 21 days until below 68°F; best results when started at 77-86°F [20][23]. NC State reports 28-day intervals did not work in its trials, and 14-21 days was needed [23].
- **Water it in.** AgriLife: mix in 4-5 gal water per 1,000 sq ft and water immediately with ¼-½ inch so product reaches stolons and roots; rake out dead material first [1]. LSU: at least ¼ inch [16]. UGA: at least 3 gal/1,000 sq ft or water in [19]. NC State: at least 1/8 inch immediately [22].
- **Heat caution.** Except azoxystrobin and thiophanate-methyl products, do not apply the AgriLife-listed fungicides at high rates during hot weather because they can stress St. Augustine and bermudagrass [1].

6. Legal-use / label section (EPA labels and SDS only - not efficacy evidence)

Read this first

Everything in this section comes from EPA-stamped labels in the EPA Pesticide Product and Label System (PPLS) [L1-L28] and manufacturer SDSs [S1-S9]. A label listing a disease is a LEGAL permission, not proof the product works on St. Augustine TARR - see Section 5 for efficacy.

Most retail lawn fungicides are sold under distributor names that share a base EPA registration (e.g., 62719-461-7401 = Ferti-lome version of 62719-461). The EPA-stamped base/master label is the legal parent; the store package may show a subset of uses. **Always confirm on the package label in hand.**

Label disease names vary: "take-all patch" (G. graminis var. avenae), "bermudagrass decline" (G. graminis var. graminis - the TARR pathogen named on bermudagrass), or "take-all root rot". **No label reviewed names "take-all root rot of St. Augustinegrass" specifically.** Where a label covers lawns/turf without naming species, use on St. Augustine depends on the label site and turf-tolerance language - confirm on the label in hand.

Rates below are copied from the label text. "--" or "Not stated" means the item was not stated in the label text reviewed; check the label in hand. Signal words are from the label front panel; SDS (OSHA/GHS) hazard classes can differ from the EPA signal word.

6.1 Homeowner-available products (residential/home-lawn use on label)

Product (distributor names)	EPA Reg. No.	Active ingredient %	Take-all on label (name used)	St. Aug.	Residential use	Label rate for take-all	Interval / timing	Max per year	Watering-in	Signal word	Key SDS hazards	Status / flags
Scotts DiseaseEx Lawn Fungicide (Lawn Fungus Granular)	538-330	Azoxystrobin 0.31%	Yes - "Take-All Patch"	Named: label says treat southern lawns such as bermudagrass and St. Augustinegrass twice in summer as well	Yes - home lawns	2-4 lb/1,000 sq ft	28 days; twice fall (Sept-Oct), twice spring (Apr-May), plus twice in summer (June-Aug) for southern lawns	37 lb product/1,000 sq ft/yr	Water 15-20 min after application if no rain expected within 24 h (general direction)	CAUTION	SDS: not classified as hazardous under OSHA HCS; no GHS signal word [S1]	Verified on EPA label [L1]
Heritage G	100-1323	Azoxystrobin 0.31%	Yes - "Take-All Patch (G. graminis var. avenae)"; homeowner table "Take-All Patch"	Named (same southern-lawn summer statement in homeowner directions)	Yes - has Homeowner Directions for Home Lawns	2-4 lb/1,000 sq ft	28 days; two apps 28 d apart spring and fall; homeowner: Sept-Oct, Apr-May, plus June-Aug twice for southern lawns	37 lb/1,000 sq ft/yr (1,613 lb/A/yr)	No take-all-specific watering line found; label gives irrigation instructions for other root diseases	CAUTION	SDS: not a hazardous mixture under OSHA HCS [S2]	Verified [L2]. Carried by BES-TEX; the product named in the BES-TEX BMP
Headway G	100-1378	Azoxystrobin 0.31% + propiconazole 0.75%	Yes - "Take-All Patch (G. graminis var. avenae)"	Not named; turf generally	Use sites include lawns around residential buildings; no homeowner-directions section found	3.5-4 lb/1,000 sq ft	28 days; two apps spring, two fall	19.2 lb/1,000 sq ft/calendar yr; max 4 apps/yr	No take-all-specific line found	CAUTION	SDS: Warning; H361d suspected of damaging the unborn child; combustible dust [S3]	Verified [L3]. Professional-oriented label; bermudagrass sensitivity statements

Product (distributor names)	EPA Reg. No.	Active ingredient %	Take-all on label (name used)	St. Aug.	Residential use	Label rate for take-all	Interval / timing	Max per year	Watering-in	Signal word	Key SDS hazards	Status / flags
BioAdvanced Fungus Control for Lawns Ready-to-Spread Granules II (also Bayer Advanced / Fortifend / Bianova names)	92564-38	Propiconazole 0.51%	Yes - "Take All Patch"	Not named	Yes - "For outdoor residential use only"	3.5 lb/1,000 sq ft (preventative rate)	Apply in fall or spring to reduce severity	Do not exceed 5 applications per year	Label: watering after application carries the fungicide into the root zone (amount not specified)	CAUTION	SDS: Warning; eye irritation Cat. 2B [S5]	Verified [L4]
Ferti-lome Liquid Systemic Fungicide II; Bonide Infuse Systemic Disease Control Concentrate	53883-184 (-7401; -4)	Propiconazole 1.55%	Yes - "Take-all patch"	Not named	Yes - "For use on residential lawns"	5 fl oz in 1 gal water per 250 sq ft (≈20 fl oz/1,000 sq ft)	Twice fall (Sept-Oct) and twice spring (Apr-May)	160 fl oz/1,000 sq ft/yr; max 8 apps/yr	No lawn watering-in instruction found (label tells users to let spray dry before watering ornamentals)	CAUTION on the 2026 label text; the EPA PPLS product record lists WARNING. Use the signal word on the package in hand	SDS: Warning; H332 harmful if inhaled; H320 eye irritation [S4]	Verified [L9]
Ferti-lome Liquid Systemic Fungicide; Monterey Fungi-Fighter; Bonide Infuse Systemic Disease Control	100-773 (-7401; -54705; -4)	Propiconazole 1.55%	Yes - "Take-All Patch"	Not named	Yes - home lawns	5 fl oz in 1 gal water per 250 sq ft	Twice fall (Sept-Oct), twice spring (Apr-May); "Southern lawns also need to be treated twice in the summer (June-August)"	Not stated in the label text reviewed	Not stated for lawns	WARNING (substantial but temporary eye injury)	SDS not reviewed	Verified [L10]. Distributor versions on store shelves vary; check the package label
Bonide Fung-onil Lawn & Garden Disease Control / Infuse Lawn & Landscape RTS; Ferti-lome RTS Liquid Systemic Fungicide	100-952 (-4; -7401)	Propiconazole 1.55%	Yes - "Take-all patch"	Not named	Yes - "specially formulated for residential use"	RTS: 1 pint per 800 sq ft (1 quart per 1,600 sq ft)	Twice fall, twice spring; southern lawns twice in summer	Not stated in the label text reviewed	Not stated	WARNING (eye injury)	SDS not reviewed	Verified [L11]
Bonide Infuse Systemic Disease Control Lawn & Landscape (granules); Jonathan Green Lawn Fungus Control	53883-183 (-4; -50931)	Thiophanate-methyl 2.08%	Yes - "Bermudagrass Decline (G. graminis var. graminis)" and "Take-All Patch"	Named in homeowner turf list ("not phytotoxic" when used per label)	Yes - homeowner turf section	1.5-3 lb/1,000 sq ft (homeowner table)	Apply mid-July or when symptoms first appear; repeat at 14-day intervals for suppression	Residential: 3 lb/1,000 per app; 12 lb/1,000 per season; max 4 apps/yr	Activate within 24 h with 0.10-0.25 in irrigation or rain	CAUTION	SDS: DANGER (GHS) - H350 may cause cancer by inhalation and H372 lung damage from prolonged dust exposure, driven by crystalline silica in the carrier [S8]	Verified [L12]. Label timing (July, curative) differs from university fall/spring preventive timing

6.2 Retail products checked that do NOT list take-all for home lawns

Product	EPA Reg. No.	Active ingredient	What the EPA-stamped label shows	Flag
Ferti-lome F-Stop Lawn Fungicide Granules; Spectracide Immunox Lawn Disease Control Granules; Green Light Fung-Away Systemic Lawn Fungicide	62719-461 (-7401; -8845; -869)	Myclobutanil 0.39%	Master label (Eagle 0.39G, 2010) lists take-all patch only in the NON-RESIDENTIAL turf table (8 lb/1,000 sq ft; 28 d; Sept-Oct or nights 55°F, and Apr-May). The RESIDENTIAL turf table (4 lb/1,000) does not list take-all. Max 46 lb/1,000/yr. CAUTION.	Not labeled for take-all on home lawns. Older AgriLife (2012) and LSU (2019) tables list these brands for take-all [1][18], but the current residential label directions do not. Follow the label in hand.

Product	EPA Reg. No.	Active ingredient	What the EPA-stamped label shows	Flag
Spectracide Immunox Multi-Purpose Fungicide Spray Concentrate	9688-123 (-8845)	Myclobutanil 1.55%	No take-all found on 2010 EPA label text.	Not labeled for take-all (label text reviewed)
Ferti-lome F-Stop Lawn & Garden Fungicide (conc. & RTS)	7401-505	Myclobutanil 1%	No take-all found on 2014 EPA label text.	Not labeled for take-all (label text reviewed)
BioAdvanced Fungus Control for Lawns Ready-to-Spray / Concentrate	92564-47	Propiconazole 2.42% (per PPLS)	No take-all found on 2018 EPA label text; "Intended for Homeowner Use Only."	Not labeled for take-all (label text reviewed)
Eagle 20EW (professional, but residential lawns allowed)	62719-463	Myclobutanil 19.7%	Take-all patch only in non-residential table (2.4 fl oz/1,000; 28 d); residential table (1.2 fl oz rate) does not list take-all.	Not for TARR on residential lawns per label

6.3 Professional / commercial products (for lawn-care operators; some allow residential lawns)

Product	EPA Reg. No.	Active ingredient %	Take-all on label (name used)	Residential lawns?	Label rate	Interval / timing	Max per year	Watering-in	Signal word	Key SDS hazards	Flags
Heritage (WG)	100-1093	Azoxystrobin 50%	Yes - "Take-all root rot / Bermudagrass Decline (Gaeumannomyces spp.)" and "Take-all patch"	Yes (lawns around residential buildings)	TARR: 0.4 oz/1,000 sq ft; TAP 0.2-0.4 oz	28 d; preventive; TAP 2 apps spring + 2 fall	10 lb product (5 lb ai)/A/yr; 1.1 lb/A per app	Not stated for TARR	CAUTION	SDS: Warning; H361d [S9]	Only label reviewed that names "take-all root rot" [L13]
Headway (Banner Heritage MAXX)	100-1216	Azoxystrobin 5.73% + propiconazole 9.54%	Yes - "Take-all Patch (G. graminis var. avenae)"	Yes	3 fl oz/1,000 sq ft	28 d; 2 apps spring, 2 fall	Not stated in the label text reviewed	Not stated	CAUTION	SDS not reviewed	[L14]
Strobe 2L (Quali-Pro)	53883-393	Azoxystrobin 22.9%	Yes - "Take-all patch (var. avenae)"; also G. graminis var. graminis in spring dead spot row	Yes	0.77 fl oz/1,000 sq ft	28 d; 2 apps spring, 2 fall	Not stated in the label text reviewed	Not stated	CAUTION	SDS not reviewed	[L25]
Insignia SC Intrinsic	7969-290	Pyraclostrobin 23.3%	Yes - "Bermudagrass decline (G. graminis var. graminis)"; "Take-all patch (var. avenae)"	Yes (residential lawns listed)	BD 0.7 fl oz/1,000 in 4 gal water; TAP 0.7 fl oz	BD: 1 app spring after green-up + 1 in fall when air temps >80°F and RH ≥75%; TAP 28 d	4.4 fl oz/1,000 sq ft/yr	4 gal water/1,000 (BD row)	WARNING (may be fatal if swallowed)	SDS: Warning; H302+H332, H315, H361, H335, H400/H410 [S6]	[L17]
Pillar G Intrinsic	7969-304	Pyraclostrobin 0.38% + triticonazole 0.43%	Yes - "Bermudagrass decline" and "Take-all patch"	Yes (residential lawns listed)	3.0 lb/1,000 sq ft	BD: 28 d; spring after green-up + fall	Max 5 apps/yr at 3.0 lb	Root diseases "will require additional irrigation"	CAUTION	SDS not reviewed	St. Augustinegrass in species list with user-safety-test caveat [L23]
Disarm G	70506-424	Fluoxastrobin 0.25%	Yes - "Take-All Patch (var. avenae)"	Yes (residential landscape areas)	100-200 lb/A (2.3-4.6 lb/1,000)	28 d; 2 apps spring, 2 fall	Not stated in the label text reviewed	Not stated for TAP	CAUTION	SDS not reviewed	St. Augustinegrass listed among turf species [L19]
Disarm 480 SC	70506-396	Fluoxastrobin 40.3%	Yes - "Take-All Patch (var. avenae)"	Yes	16.0 fl oz/A (0.36 fl oz/1,000 sq ft)	28 d; 2 spring, 2 fall	Not stated for turf	Not stated for TAP	CAUTION	SDS not reviewed	[L18]

Product	EPA Reg. No.	Active ingredient %	Take-all on label (name used)	Residential lawns?	Label rate	Interval / timing	Max per year	Watering-in	Signal word	Key SDS hazards	Flags
Bayleton FLO	101563-112	Triadimefon 43%	Yes - "Bermudagrass decline (G. graminis var. graminis)" and "Take all patch"	Yes, with residential limits	1-1.41 fl oz/1,000 (residential ≤1.4 fl oz)	Preventive: begin before symptoms appear; start cultural controls at the same time; min. 14-day interval (non-golf)	Residential/non-golf turf: 2.67 fl oz/1,000/yr (3.78 lb ai/A/yr)	Must thoroughly irrigate immediately to move a.i. into crown and root zone (amount depends on root depth)	CAUTION	2008 MSDS (older): harmful if swallowed, inhaled or absorbed; may cause skin allergy [S7]	[L16]. Current SDS not reviewed
Banner MAXX II	100-1326	Propiconazole 14.3%	Yes - "Take-All Patch (G. graminis)"	Turfgrass generally; residential lawns not specifically mentioned (2015 label)	2-4 fl oz/1,000 sq ft	1-2 fall apps (Sept-Oct or nights 55°F) + 1-2 spring (Apr-May)	16 fl oz/1,000 sq ft/calendar yr	Not stated	CAUTION	SDS not reviewed	Bermudagrass sensitivity warning [L15]
3336 F (Cleary); Cavalier F	1001-69	Thiophanate-methyl 41.25%	Yes - "Bermudagrass Decline (var. graminis)" and "Take-All Patch"	Turf use: "Not for homeowner use" - certified applicators only (homeowner sub-label covers ornamentals, not turf)	4-6 fl oz/1,000 sq ft	Mid-July or at first symptoms; repeat 14 d for suppression	Not stated for turf in the label text reviewed	"Water treatment into active root zone"	CAUTION	SDS not reviewed	St. Augustinegrass named as tolerant [L20]
Tourney EZ	59639-257	Metconazole 42.5%	Yes - "Take-all Patch (G. graminis)"	Yes	0.37 fl oz/1,000 sq ft (16 fl oz/A; listed with other patch diseases)	14 d	½ gal (2 lb ai)/A/yr; max 8 apps/yr	Not stated	CAUTION	SDS not reviewed	St. Augustinegrass in species list [L21]
Trinity	7969-257	Triticonazole 19.2%	Yes - "Take-all patch (var. avenae)"	Yes	1.0-2.0 fl oz/1,000 sq ft	14-28 d; 1-2 fall (Sept-Oct) + 1-2 spring (Apr-May)	Not stated for turf in the label text reviewed	Not stated	CAUTION	SDS not reviewed	[L22]
Caravan G	100-1415	Azoxystrobin 0.31% + thiamethoxam 0.22% (insecticide)	Yes - "Take-all patch (var. avenae)"	Yes (residential lawns)	2.0-2.8 lb/1,000 sq ft	Fall and spring; follow with Heritage G or Headway G 14-21 d later	Not stated in the label text reviewed	Not stated	CAUTION	SDS not reviewed	Contains a neonicotinoid insecticide - use only if an insect target also exists [L27]
Torque (tebuconazole)	1001-87	Tebuconazole 38.7%	Yes - "Bermudagrass decline" (0.6-1.1 fl oz)	NO - "For use on golf course turf only. Do not use on home lawns"	--	--	--	"Depending on the disease, water into crown and active root zone"	CAUTION	SDS not reviewed	Not legal on home lawns [L26]

6.4 Label-section notes and limits

- **Fenarimol (Rubigan):** no active product was returned by EPA PPLS product-name searches for "fenarimol" or "rubigan" [L28]. That search covers product names, not every registration; treat fenarimol as not a current lawn option.
- **Tebuconazole homeowner lawn products:** none identified in this review. Professional Torque is golf-course-only [L26].

- **Signal word vs. SDS:** EPA signal words (CAUTION/WARNING/DANGER) are based on acute toxicity of the product as sold; OSHA/GHS SDS classifications can add chronic or dust hazards. Example: Bonide Infuse granules carry CAUTION on the EPA label [L12] but the SDS lists GHS DANGER for crystalline silica dust [S8].
- **Supplemental distributor labels:** EPA PPLS generally stores the base registrant's master label; individual store-brand package labels (e.g., Ferti-lome, Spectracide versions) were not reviewed separately. Their package directions must match or be narrower than the master label.
- **State registration: Texas registration status was not checked for this review. Pesticides sold in Texas must be registered with the Texas Department of Agriculture.**
- **SDS coverage:** SDSs were retrieved for 9 key products [S1-S9]; others are marked "SDS not reviewed."

7. Seasonal timing calendar for San Angelo (estimated)

Soil-temperature triggers come from research [20][22][23] and label windows from [L1][L2][L4][L9]. **Month estimates for San Angelo are inferences (grade D)** - no measured San Angelo soil-temperature series was found. Use a soil thermometer at 2 inches, read in the morning, averaged over several days.

Window	Soil temperature / trigger	Cultural actions	Fungicide (preventive, label permitting)	Evidence notes
Late Feb - Mar (pre-green-up)	Soil warming toward green-up	Soil test (pH, P, K, Mn, Fe); check irrigation coverage and run times; no lime.	LSU programs start one spring application mid- to late March [16][17].	LSU timing is from Louisiana; labels mostly say April-May.
Apr - May (green-up)	Grass actively growing; symptoms often show now [1][2]	Diagnose any yellow patches (pull stolons; lab test [7]). Fertilize by soil test with ammonium-based N ≤1 lb N/1,000 per app [1]. Mow high [2]. Core-aerate once growing [2]. Peat topdressing option (timing unproven [4]).	Labels: two applications 28 days apart in spring (Apr-May) [L1][L2][L9]; Insignia/Pillar: one after green-up [L17][L23]. Water in ¼-½ in [1].	AgriLife: spring and fall best [1].
Jun - Aug (heat)	Soil often above 86°F	Deep, infrequent irrigation; avoid excess N; raise mowing height; watch chinch bugs (look-alike) [1][2].	Azoxystrobin labels allow 2 summer apps for southern lawns (St. Augustine) [L1][L2]. AgriLife: avoid high DMI rates in hot weather [1].	Summer applications have little research support for TARR in Texas.
Mid-Sep - late Oct (prime fall window)	Start as 2-in soil cools to ≈86°F; continue while 68-86°F [20][23]	Avoid late heavy N; correct drainage; aerate early in window if needed.	Labels: two applications 28 d apart, Sept and Oct [L1][L2][L9]; NC State saw 14-21 d intervals work better than 28 d (golf) [23]; LSU: mid/late Sept and mid/late Oct [16].	Best-supported window across sources, but San Angelo dates are estimates.
Nov - Feb (dormancy)	Below 68°F; pathogen slows [23]	Water only to prevent drought stress; keep leaves/debris off.	None recommended by sources reviewed.	--

8. Gaps, conflicts, and uncertainty

- **No West Texas trials.** All Texas field work found was on Dallas lawns [4][5]; Texas isolates came from central and east Texas counties [8][9]. Effects of calcareous soils, hard/high-bicarbonate water, and San Angelo's climate on TARR and on any treatment are untested.
- **Curative control is weak.** Texas, Louisiana, Florida and Georgia sources all say fungicides work best before symptoms and are inconsistent after [1][12][16][19].
- **Conflicting DMI results.** Propiconazole gave no benefit on Dallas St. Augustine lawns [5] and several DMIs were associated with decline on Florida bermudagrass greens [11], while golf research rates propiconazole products well [22][25]. Triadimefon looked useful in Georgia lawns [21][32] but was in the decline group in Florida [11].
- **Thin effect-size data.** The only St. Augustine percentage found (30-35% severity reduction) is a secondhand citation of a meeting abstract [21][32]. The Dallas fungicide and peat data were read only at abstract/report level [4][5].
- **Peat moss.** Rate (1 bale/1,000 sq ft) is documented; best timing is not [4]; durability (2 years) was measured in Dallas, not on calcareous West Texas soils [5][6].
- **pH lowering in calcareous soil.** AgriLife recommends acidification "if practical" [1]; Utah State field data show acidifying amendments do not lower calcareous soil pH long-term [28]. Whether surface or microsite acidification helps TARR in San Angelo is unknown.
- **Pathogen complexity.** Three Gaeumannomyces species cause TARR in Texas with different temperature preferences and aggressiveness [8]; whether they respond differently to cultural practices or field rates of fungicides is unknown. In vitro sensitivity [9] has not been field-validated.

- **Nutrients.** Manganese evidence is from bentgrass take-all patch [31]; potassium and iron benefits against TARR are not demonstrated in the sources found. Nitrogen guidance conflicts in emphasis: limit N to avoid thatch [1][26] vs. low N increasing necrosis in greenhouse bermudagrass [24].
- **Shade.** Dallas surveys linked TARR to heavy shade [4][5]; LSU's 2010 outbreak was mostly in full sun [16].
- **Products and labels.** Extension product tables are dated (AgriLife 2011-2012; LSU 2019) [1][3][18] and some brands they list are not labeled for take-all on home lawns under current master labels [L6][L7][L8]. Texas state registration status was not checked for this review.

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Excluded sources

Seen in searches but not used as evidence: garden-media columns, GCM Online (trade magazine; it summarized NC State research also cited here from primary/abstract sources), USGA Green Section articles, retailer product pages, and manufacturer marketing pages.

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