

APPLICATION FOR APPROVAL OF  X  CULTIVARS   ASSOCIATE CULTIVARS  
(Please check appropriate type of application)

1. Crop: Tall Fescue (*Festuca arundinacea* Schreb.)
2. Experimental no. or name: Georgia 5, GA-5+, GA-5-EI
3. Pedigree and history: Georgia 5 tall fescue is a 5 clone synthetic cultivar. The 5 parental clones originated from 21 clones collected by the USDA-SCS from stress areas throughout the eastern US and maintained in the field at the Americus Plant Materials Center, Americus, GA for approximately 10 years. In 1977, the 9 best surviving plants were polycrossed at Athens, GA and their polycross progeny tested for survival and yield over 2 years in Americus. The 5 parental clones were then selected based on their polycross progeny performance. The syn 3 generation is defined as breeders seed and will be used to produce foundation (syn 4) and certified seed (syn 5).
4. Description: Georgia 5 tall fescue is an endophyte-infected cultivar (causal fungi is *Acremonium coenophialum* Morgan-Jones and Gams) with the level of infection > 75% (ie. > 75% of the germinating seedlings are infected with the endophyte using a seedling grow-out test). It is adapted to the southern coastal plain region of the southeastern US (Gulf Coast area from southern Texas through southern Georgia and northern Florida) and low maintenance, stress areas of the transition zone (northern Mississippi through northern Georgia including Tennessee). It is wide-bladed and has medium early maturity with an average heading date 5 days earlier than 'Kentucky 31', but 7 days later than 'AU Triumph' at Athens, GA.
5. Station(s) where developed: College Station and Americus Plant Materials Center
6. Participating scientist(s): Joe Bouton (breeder). The breeder gratefully acknowledges the technical help of Donald Wood and the entire staff of the Americus Plant Materials Center during the development and testing and the participation of Roger Gates and Gary Hill in conducting the animal grazing trials.

Copy of the appropriate and adequate data comparing proposed release to standard cultivar must be attached to this form.

7. In what respect is the new cultivar superior to the cultivar now in use? or reasons for proposing release as an associate cultivar. The southern coastal plain region currently lacks a dependable, perennial cool season forage grass. When tested against the standard perennial, cool season species and other endophyte-infected and endophyte-free tall fescue cultivars, Georgia 5 showed superior forage yield and persistence in clipped plots in this region (Tables 1-8). The endophyte-infected version of Georgia 5 is also greatly superior to its endophyte-free version in this stressful area (Tables 7 and 8). Its persistence is very evident when mixed with bermudagrass and bahiagrass and grazed (Tables 13 and 14). Animal gains indicated Georgia 5 to be useful for extensive winter maintenance

grazing thereby giving the livestock producer an alternative to expensive hay and grain feeding (Table 14). Its yield and persistence in the fescue growing region of northern Georgia was similiar to other cultivars (Tables 9-11) while its distribution of forage in this region is more similiar to Kentucky 31 than AU Triumph (Table 12). Its turf performance and quality is similiar to Kentucky 31 (Tables 16 and 17) for non-stress environments. Based on pasture performance and Gainesville, Florida data (Table 15), its turf performance is expected to be superior to Kentucky 31 in areas of high temperature and water stress. Georgia 5 is therefore being released to replace Kentucky 31 for use as winter maintenance pasture in mixtures with warm-season grasses in the Southern Coastal Plain and as a general purpose turfgrass in the tall fescue transition zone.

8. Method of propagation: Seed
9. Amount of breeder seed stocks available (if applicable): The 0.75 acre breeder block producing syn 3 seed is maintained at the Plant Sciences Farm near Watkinsville, GA. Since endophyte-infected seed has a short storage life, breeders seed will be produced from the breeders block on a yearly basis. This results every year in production of approxiamtely 200 pounds of clean breeders seed.
10. Amount of foundation seed stocks available (if applicable): Currently 5 acres in production in Oregon and 10 acres in Georgia.
11. Amount of cutting or bud material available for vegetatively propagated material for nursery distribution (if applicable): Not applicable
12. Is there likely to be unusual difficulty encountered in the production of any class of seed stocks? Explain. The endophyte-infection level of any foundation or certified seed field must be >75%. The same level of infection should also be guaranteed with a recent (less than 6 months), grow-out test before sale of certified seed.
13. Three suggested names for the cultivar: Georgia 5, Georgia 5-EI, and Georgia 5+.
14. Name approved by the plant cultivar and germplasm release committee: \_\_\_\_\_  
Georgia 5
15. Form of intellectual property protection: Plant Variety Protection
16. Is a royalty assessment recommended: X Yes      No

RECOMMENDED BY:

A. Joe Bonten

Originating Scientist

B. David E Kissel

Department Head


D. David E Kissel

Chairperson, GAES Plant Cultivar and  
Germplasm Release Committee

E. Chew Lyle

Associate Director of the Appropriate Station

APPROVED:

Clive W. Honoko 

Director of Experiment Stations

Table 1. Annual forage dry matter yields (September - June) of four tall fescue cultivars when tested at Americus, Georgia during 1983-86. Test established November, 1982.

<u>Cultivar</u>	<u>1982-83</u>	<u>1983-84</u>	<u>1984-85</u>	<u>1985-86</u>	<u>Avg.</u>
----- kg ha-1 -----					
Georgia 5 (Syn 2)†	2425	6086	1200	1908	2904
Kentucky 31†	2755	4915	405	335	2102
AU Triumph‡	2861	4523	392	236	2003
Kenhy‡	2755	3693	324	192	1596
LSD (5%)	NS	2055	293	834	705

†Endophyte-infected

‡Endophyte-free

Table 2. Annual forage dry matter yields (September-June) and ending stands (% ground covered by tall fescue) of three tall fescue cultivars when tested at Quincy, Florida during 1985-87. Test established November, 1983. Data obtained courtesy of Bob Stanley, North Florida Res. and Ed. Cntr., Quincy, FL 32351.

<u>Cultivar</u>	<u>1984-85</u>	<u>1985-86</u>	<u>Avg.</u>	<u>Stands (May, 1987)</u>
----- kg ha-1 -----				%
Georgia 5 (Syn 2)†	816	3985	2400	35 a§
Kentucky 31†	238	2518	1378	15 ab
AU Triumph‡	1391	3227	2309	7 b
LSD (5%)	634	1131	482	

†Endophyte-infected

‡Endophyte-free

§ Means followed by the same letter are not significantly different as determined by an LSD value ( $p < 0.05$ ) calculated from data subjected to a square root transformation.

Table 3. Annual forage dry matter yields (no yields taken June-October) and ending stands (% ground covered by tall fescue) of tall fescue cultivars when harvested at Baton Rouge, Louisiana during 1986-88. Test established November, 1985. Data obtained courtesy of Richard Joost and Danny Coombs, Agronomy Dep., LSU, Baton Rouge, LA.

<u>Cultivar</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>Avg.</u>	<u>Stands (11/88)</u>
	----- kg ha-1 -----				%
Georgia 5 (Syn 2)†	8859	10304	8254	9139	75
Kentucky 31†	8635	9587	6832	8355	79
Forager‡	8411	9777	6585	8254	48
Penngrazer‡	9038	9161	6204	8131	71
AU Triumph‡	7470	9486	6048	7672	31
Kentucky 31‡	7616	8747	6462	7616	62
Johnstone‡	3058	5264	4670	4334	47
LSD (5%)	1467	1758	1265	1165	17

†Endophyte-infected

‡Endophyte-free

Table 4. Annual forage dry matter yields (September-June) of tall fescue cultivars when harvested at Tifton, Georgia during 1986-87. Test established November, 1984. Data obtained courtesy of Warren Monson, USDA-ARS, Coastal Plain Exp. Stn., Tifton, GA.

<u>Cultivar</u>	<u>1985-86</u>	<u>1986-87</u>	<u>Avg.</u>
	-----kg/ha-----		
Georgia 5 (Syn 2)†	1911	2381	2146
Kentucky 31†	1155	0	579
AU Triumph‡	1357	0	679
LSD (5%)	NS	1303	714

†Endophyte-infected

‡Endophyte-free

Table 5. Annual forage dry matter yields of tall fescue cultivars when harvested at Brewton, Alabama during 1987-89. Test established in the fall of 1986. Data obtained courtesy of Edzard van Santen, Auburn University.

<u>Cultivar</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>Avg.</u>
	-----kg/ha-----			
Georgia 5 (Syn 2)†	6712	3568	2330	4203
AU Triumph‡	6512	3725	2125	4121
Mozark‡	6474	2899	1789	3720
Kentucky 31‡	6340	3814	2051	4068
Kentucky 31†	6321	3452	1667	3814
Martin‡	6129	3999	1831	3986
Forager‡	5772	3286	1652	3570
Johnstone‡	5307	2334	1433	3025
LSD (5%)	NS	713	548	926

†Endophyte-infected

‡Endophyte-free

Table 6. Annual forage dry matter yields of tall fescue, smooth brome grass, and phalaris cultivars in Angleton, Texas during 1984-86. Test established in October, 1984. Data obtained courtesy of Gerald Evers, Texas A&M Univ., Overton, TX.

<u>Cultivar</u>	<u>1984-85</u>	<u>1985-86</u>
	-----kg/ha-----	
Georgia 5 Tall Fescue (Syn 2)†	4637	7411
Bellegarde Smooth Bromegrass	4406	2900
Kenhy Tall Fescue‡	4385	5649
Baylor Smooth Bromegrass	3336	2425
Sirosa Phalaris	3284	4118
Sirolan Phalaris	3082	4960
LSD (5%)	445	1093

†Endophyte-infected

‡Endophyte-free

Table 7. Annual forage dry matter yields (September-June) and final stands (percentage of ground covered with tall fescue) of tall fescue cultivars at Americus, Georgia during 1987-91. Test established in October, 1987. Data obtained courtesy of Mike Owsley, USDA-SCS, Americus, GA.

<u>Cultivar</u>	<u>1987-88</u>	<u>1988-89</u>	<u>1989-90</u>	<u>1990-91</u>	<u>Avg.</u>	<u>Stand</u>
	-----kg/ha-----					%
Georgia 5 (Syn 3)†	6504	7554	6290	1718	5516	46
Georgia 5 (Syn 3)‡	4759	0	0	0	1190	0
AU Triumph‡	4615	0	0	0	1154	0
LSD (5%)	592	ND	ND	ND	ND	ND

†Endophyte-infected

‡Endophyte-free

Table 8. Annual forage dry matter yields (September-June) and final stands (percentage of ground covered with tall fescue) of tall fescue cultivars at Tifton, Georgia during 1987-91. Test established in October, 1987. Data obtained courtesy of Roger Gates, USDA-ARS, Tifton, GA.

<u>Cultivar</u>	<u>1987-88</u>	<u>1988-89</u>	<u>1989-90</u>	<u>1990-91</u>	<u>Avg.</u>	<u>Stand</u>
	-----kg/ha-----					%
Georgia 5 (Syn 3)†	8204	4189	4560	2100	4764	38
AU Triumph‡	6616	5624	4302	530	4268	5
Georgia 5 (Syn 3)‡	6101	4032	3225	652	3502	11
LSD (5%)	1165	1163	664	924	440	21

†Endophyte-infected

‡Endophyte-free

Table 9. Annual forage dry matter yields (September-June) and final stands (percentage of ground covered with tall fescue) of tall fescue cultivars at Watkinsville, Georgia during 1987-91. Test established in October, 1987. Data obtained courtesy of Dave Belesky and Steve Knapp, USDA-ARS, Watkinsville, GA.

<u>Cultivar</u>	<u>1987-88</u>	<u>1988-89</u>	<u>1989-90</u>	<u>1990-91</u>	<u>Avg.</u>	<u>Stand</u>
	-----kg/ha-----					%
AU Triumph‡	5269	6462	8953	3283	5992	92
Georgia 5 (Syn 3)†	5045	5393	8143	2753	5333	95
Georgia 5 (Syn 3)‡	4459	5536	8220	2714	5232	97
LSD (5%)	567	483	NS	217	285	NS

†Endophyte-infected  
‡Endophyte-free

Table 10. Annual forage dry matter yields and final stands (percentage of ground covered with grass) of tall fescue cultivars at Athens, Georgia during 1987-89. Test established in September, 1986. Data obtained courtesy of Carl Hoveland, Agronomy, Dept., Univ. of Georgia, Athens, GA.

<u>Cultivar</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>Avg.</u>	<u>Stand</u>
	-----kg/ha-----				%
AU Triumph‡	8599	10990	11842	10477	96
Georgia 5 (Syn 3)†	8417	9600	10949	9655	99
Kentucky 31	8217	9577	10778	9524	98
Forager‡	7986	9961	10430	9459	95
Penngrazer	7519	9770	11111	9467	99
Safe‡	7206	8734	10898	8946	97
Georgia 5 (Syn 3)‡	7137	9175	9926	8746	97
Roa	6840	8412	8935	8062	89
Johnstone‡	5891	9851	10790	8844	98
LSD (5%)	953	928	1056	607	NS

†Endophyte-infected  
‡Endophyte-free



Table 11. Annual forage dry matter yields and final stands (percentage of ground covered with tall fescue) of tall fescue cultivars at Blairsville, Georgia during 1987-89. Test established in September, 1986. Data obtained courtesy of Carl Hoveland, Agronomy, Dept., Univ. of Georgia, Athens, GA.

<u>Cultivar</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>Avg.</u>	<u>Stand</u>
	-----kg/ha-----				%
Forager‡	10624	8590	8710	9308	90
Penngrazer	10549	9203	8377	9376	92
Kentucky 31	10337	9218	8940	9498	86
Georgia 5 (Syn 3)‡	10077	7844	7862	8594	93
AU Triumph‡	9942	8014	8077	8677	89
Georgia 5 (Syn 3)†	9786	8429	8469	8895	90
Safe‡	9091	8183	7266	8180	89
LSD (5%)	1057	873	790	648	NS

†Endophyte-infected

‡Endophyte-free

Table 12. Seasonal distribution of tall fescue forage dry matter when tested at Athens, Georgia during a three year period (1987-89). Test established in September, 1986. Data from Hoveland, et al., 1990.

<u>Cultivar</u>	<u>Late</u> <u>Winter</u>	<u>Summer</u>	<u>Autumn</u>
	-----kg/ha-----		
AU Triumph‡	2609	6563	1310
Kentucky 31	1758	6854	907
Georgia 5 (Syn 3)†	1825	6776	1052
LSD (5%)	280	470	280

†Endophyte-infected

‡Endophyte-free

Table 13. Effect of summer grazing management on winter stands (% of ground covered with tall fescue) and forage dry matter yields (both parameters measured in January, 1991) of tall fescue cultivars grown in bermudagrass sod at Winnsboro during 1988-91. Test established in November, 1988. Data obtained courtesy of Wink Alison, Macon Ridge Location NE Res. Stn., LSU, Winnsboro, LA.

<u>Cultivar</u>	<u>Summer Grazing Management</u>			
	<u>Continuous</u>	<u>Rotational</u>	<u>Hay</u>	<u>Avg.</u>
	-----kg/ha (% stand)-----			
Georgia 5 (Syn 3)†	1288 (77)	815 (43)	907 (42)	1002 (54)
Kentucky 31†	921 (54)	461 (31)	518 (27)	633 (37)
AU Triumph‡	940 (44)	465 (23)	324 (13)	576 (27)
Kentucky 31‡	567 (40)	325 (21)	183 (11)	359 (24)
Georgia 5 (Syn 3)‡	393 (16)	285 (11)	190 ( 8)	290 (12)
LSD (5%)	310 (10)	296 (11)	281 (14)	172 ( 7)

†Endophyte-infected

‡Endophyte-free

Table 14. Winter performance (December 5 to April 20 in each year) of yearling heifers grazing bermudagrass and bahiagrass pastures containing two treatments; 1) dormant grass interseeded with Georgia 5 (endophyte infected) tall fescue in November 1988 or 2) dormant grass with hay and grain fed to animals (control).

<u>Parameter</u>	<u>1989-90</u>		<u>1990-91</u>	
	<u>Georgia 5</u>	<u>Control</u>	<u>Georgia 5</u>	<u>Control</u>
Avg. fescue available (kg/ha)	421	0	373	0
Hay fed (kg/head/day)	0.5	5.9	0	6.2
Grain fed (kg/head/day)	0	1.3	0	1.3
Stocking rate (head/ha)	4.7	7.7	2.5	9.5
Grazing days/ha	531	951	331	1067
Avg. daily gain (kg)	0.2	0.7	0.4	0.5
Gain/ha (kg)	166	508	119	590

Table 15. Turf performance of tall fescue cultivars at the Turfgrass Field Laboratory, Gainesville, Florida. Test established on 9 November 1981 at seeding rate of 10 lbs/1000 sq.ft. Data obtained courtesy of A. E. Dudeck, Ornamental Horticulture Dept., University of Florida, Gainesville, FL.

<u>Cultivar</u>	<u>Quality*</u>	<u>Ground Cover Estimates</u>			
	<u>June, 1982</u>	<u>April, 1982</u>	<u>June, 1983</u>	<u>March, 1984</u>	<u>March, 1985</u>
		-----%-----			
Georgia 5 (Syn 2)†	6.0	99.8 a‡	62.9 a	54.0 a	31.0 a
Kentucky 31†	6.0	99.5 a	1.5 b	1.0 b	1.0 b

\*Turf quality rated 1 to 9 where 9=best.

†Endophyte-infected

‡Means within columns with the same letter are not significantly different using the Waller Duncan k-ratio t-test (p=0.05).

Table 16. Turf performance of tall fescue cultivars at the Turf Plots, Athens, Georgia during 1981-84. Test established on 10 October 1981 at seeding rate of 10 lbs/1000 sq. ft. Leaf and shoot data taken on 20 June 1984 and was obtained courtesy of Gil Landry and Keith Karnok, Agronomy Dept., Univ. of Georgia.

<u>Cultivar</u>	<u>April, 1982</u>		<u>March, 1984</u>		<u>Leaf</u>	<u>Shoot</u>	<u>Leaves/Shoot</u>
	<u>Cover</u>	<u>Quality*</u>	<u>Cover</u>	<u>Quality</u>	<u>Width</u>	<u>Density</u>	
					mm	-----no.-----	
Georgia 5 (Syn 2)†	94	5.5	96	5.8	4.8	26.3	2.7
Kentucky 31	92	5.5	96	5.8	4.5	27.7	2.9
Rebel	ND‡	ND	ND	ND	3.6	47.8	3.4

\*Turf quality rated 1 to 9 where 9=best

†Endophyte-infected

‡ND=Not determined

Table 17. Turf performance of tall fescue cultivars at the Turf Experimental Plots, Griffin, Georgia during 1991. Test established in October, 1990 at a seeding rate of 10 lbs/1000 sq. ft. Data obtained courtesy of Bob Carrow, Agronomy Dept., Griffin, GA.

<u>Cultivar</u>	<u>Quality</u>	<u>Color</u>	<u>Density</u>	<u>Leaf Width</u>	<u>Brown Patch†</u>
	-----Avg. rating‡-----			mm	%
Rebel II	7.5	7.7	8.5	5.8	6
Rebel Jr.	6.9	8.0	8.3	5.3	14
Georgia 5 (Syn 3)§	6.3	7.0	7.7	6.3	14
Kentucky 31	6.0	7.3	7.5	6.4	6
Bonsai	5.8	8.0	8.0	4.7	40
LSD (5%)	0.5	0.4	ND¶	0.6	10

†% of plot infected with brown patch on 8 August.

‡Average of multiple measurement dates from April 3, 1991 to September 9, 1991. No of measurement date: Quality = 11, Color = 6, and Density = 3. Rating system is based on 1 to 9 scale with 9 = ideal.

§Endophyte-infected

¶ND=Not determined