Johnson 1494

APPLICATION FOR RELEASE

APPLICATION FOR RELEASE OF (check one):

- ☐ CULTIVAR
- x ASSOCIATE CULTIVAR
- ☐ GERMPLASM
- ☐ PARENTAL LINE
- ☐ GENETIC STOCK

1. Crop: **Wheat**

2. Experimental no. or name: **GA 991209-6E33**

3. Pedigree and history: : **GA 991209-6E33 is a F_5-derived line from the cross of SS 524 / GA 96004 // AGS 2000. SS 524 is a good line that has 1A/1R translocation for powdery mildew resistance. GA 96004 is a breeding line developed from the cross, Coker 9134 *4 // GA 931433. GA 931433 is a breeding line developed from the cross Coker 797 *4 / TcLr 19. The final cross was made in the spring of 1999. The F1 plants were grown in the field at Plains, GA. The pedigree method of breeding was used to advance the segregating populations. Individual spike selections were made in the F2 to F5 generations at Plains, GA. In 2004, a single headrow in the F5 generation was harvested and selected as GA 991209-6E33. In 2005, it was evaluated at two locations (Plains and Griffin, GA). During 2006, GA 991209-6E33 was evaluated at 3 locations in Georgia and one location in Florida and Alabama and in a regional nursery (Southern University Preliminary Nursery, SUNPRE) at 5 locations (AR, FL, GA, LA, and NC). In 2007, GA 991209-6E33 was evaluated at 6 locations (AR, FL, GA, LA, NC, and VA) in a regional nursery (Gulf Atlantic Wheat Nursery, GAWN). From 2007-2009, GA 991209-6E33 was evaluated in Georgia's Small Grain Performance Trials. It was also evaluated in 2008 in the Uniform Southern Wheat Nursery at 21 locations.**

In 2006, a small block (100 sq. ft) was planted in Griffin, GA from remnant seed of a headrow in F6 generation and was rogued thoroughly for aberrant types. In 2007, a small strip (500 sq.ft) was planted in Plains, GA and rogued thoroughly for aberrant types. In 2008, six increase strips of GA 991336-6E33 were planted at Plains, GA. The three middle strips were rogued thoroughly for aberrant types to create breeder seed. The Georgia Seed Development Commission increased the breeder seed of GA 991336-6E33 in 2009.

4. Description of plant material: **GA 991209-6E33 is a high grain yielding, medium maturing, good test weight, medium height line (Tables 1, 2, 4, 6, 8, 9, 10, 12, 13, 14, 16, 18). Its maturity averages about 2 day earlier than AGS 2000 in Georgia and is similar to maturity as AGS 2020. It is moderately resistant to**

races of leaf rust and stripe rust in Georgia and the Southeast (Tables 3, 5) and to powdery mildew (Table 3, 5, 9, 12). It is resistant in the field to current biotypes of Hessian fly in Georgia (Tables 14). It is moderately susceptible to wheat soil-borne mosaic virus (Table 12).

5. Need for and potential users of plant material: **GA 991209-6E33 will be released as an Associate Cultivar due to its good grain yield performance in Georgia's Trials (Tables 1, 2, 4, 6, 8, 9, 10, 12, 13, 14, 16, 18) as compared to other medium maturing cultivars and its Hessian fly resistance (Table 17) and its moderate resistance to leaf and stripe rust (Tables 3, 5, 11, 15). Representatives from AGSouth Genetics, Inc., UniSouth Genetics and Pioneer Hi-Bred International have indicated an interest in licensing GA 991209-6E33.**

6. Justification for release: **GA 991209-6E33 is an early-medium maturity line with high levels of resistance to Hessian fly as compared to AGS 2020. It is only moderately resistant to leaf and stripe rust (Table 3, 5, 11, 15). The most commonly grown medium maturing varieties currently include AGS 2020, AGS 2060, Coker 9553, and PIO 26R31. For two year averages (Tables 6, 7), GA 991336-6E33 was equal to the most commonly grown varieties for grain yield and also had a high level of Hessian fly resistance (Table 17). It will be a replacement for AGS 2020.**

7. Participating scientists: **David Buntin, James Buck, Dan Bland, Steve Sutton, John Youmans**

8. Location(s) at which plant material was developed: **Griffin, GA**

9. Recommended form of intellectual property protection and royalty: **Plant Variety Protection Certificate and assess royalty on each 50 lb. unit of seed.**

Cultivar and associate cultivar applications only provide the following information:

10. Method of propagation: **Seed**

11. Amount of breeder seed stocks available (if applicable): **20**

12. Amount of foundation seed stocks available if applicable: **800**

13. Amount of cutting or bud material available for vegetatively propagated material for nursery distribution (if applicable):

14. Describe any unusual difficulty anticipated in the production of any class of seed stocks: **None**

15. Suggest up to three names for the cultivar: **Allow the licensee to determine the name.**

16. Name approved by plant cultivar and germplasm release committee:

APPLICATION FOR RELEASE

Application for the release of (GA 991336-6E33 Wheat)

Recommended:

A. _____ Originating Scientist — 8/20/09 Date

B. _____ Department Head — 8/26/09 Date

C. _____ For Griffin and Tifton, Assistant Dean — 8/25/9 Date

D. _____ Chair, GAES PCGRC — 9/16/09 Date

E. _____ Associate Dean for Research — 9/17/05 Date

Approved:

F. _____ Dean and Director — 9-21-09 Date

Table 1. Average Performance of GA entries and Checks in Elite Nursery Multi-Locations* (5 loc), 2006.

Entry	Yield bu/A	Test Wt. lbs/bu	Head Date Julian	Height inches
GA 991336-6E9	87.1a	59.0a	95ab	34a
GA 991371-6E12	86.7a	58.8a	96a	35a
GA 991209-6E33	86.6a	59.5a	93b	35a
AGS 2000	84.5a	59.0a	95ab	34a
PIO 26R61	75.8b	60.1a	96a	35a
Coker 9553	78.4b	59.8a	95ab	34a
AGS 2031	76.0b	59.2a	94ab	35a

* Plains, Griffin, Calhoun, GA; Quincy, FL; Belle Mina, AL
Numbers with same letters are not significantly different at the P=0.05.

Table 2. Average Performance of GA entries and Checks in Multi-State* Performance Trials (5 Loc., Southern University Preliminary nursery, SUNPRE), 2006.

Entry	Yield bu/A	Test Wt. lbs/bu	Head Date Julian	Height inches
GA 991336-6E9	90.1a	59.9ab	98a	37a
GA 991209-6E33	90.6a	59.7ab	95b	40a
AGS 2000	80.8b	58.8bc	97a	38a
PIO 26R61	80.9b	60.6a	98a	42a
TERRAL 841	80.8b	57.1c	97a	36a

*Arkansas, Florida, Georgia, North Carolina, Louisiana
Numbers with same letters are not significantly different at the P=0.05.

Table 3. Average Performance of GA entries and Checks in Multi-State* Performance Trials (5 Loc., SUNPRE), 2006.

Entry	Lodging 0-9	Powdery Mildew 0-9	Leaf Rust 0-9	Stripe Rust 0-9
GA 991336-6E9	0.9a	0.5a	0.5a	0.3a
GA 991209-6E33	1.0a	2.0bc	3.0b	4.2b
AGS 2000	2.3a	1.0ab	1.7a	5.2b
PIO 26R61	1.0a	2.5cd	1.8a	2.3a
TERRAL 841	1.3a	3.5d	1.7a	0.0a

*Arkansas, Florida, Georgia, North Carolina, Louisiana
Numbers with same letters are not significantly different at the P=0.05.
Scale: 0 resistant and 9 susceptible

Table 4. Average Performance of GA entries and Checks in Multi-State* Performance Trials (5 Loc. Gulf Atlantic Wheat Nursery, GAWN), 2007.

Entry	Yield bu/A	Test Wt. lbs/bu	Head Date Julian	Height inches
GA 991336-6E9	81.9a	59.6a	98b	33a
GA 991371-6E12	82.8a	59.6a	97b	34a
GA 991209-6E33	79.3ab	60.1a	97b	33a
AGS 2000	86.9a	59.8a	97b	32a
USG 3209	80.9ab	58.6b	97b	31a
SS 8641	74.3b	58.9ab	102a	33a

*Georgia, North Carolina, Louisiana, Virginia, Texas
Numbers with same letters are not significantly different at the P=0.05.

Table 5. Average Agronomic Traits of GA entries and Checks in Multi-State* Performance Trials (GAWN), 2007.

Entry	Powdery Mildew+ 0-9	Leaf Rust+ 0-9
GA 991336-6E9	0.8a	0.2a
GA 991371-6E12	1.5a	0.3a
GA 991209-6E33	0.5a	1.8b
AGS 2000	0.8a	0.8a
USG 3209	0.8a	2.6b
SS 8641	0.0a	0.0a

*Georgia, Virginia, Texas
+ highest rating was 6.0 for powdery mildew and 9.0 for leaf rust
Scale: 0 resistant and 9 susceptible
Numbers with same letters are not significantly different at the P=0.05.

Table 6. Average Performance of GA entries and Checks in Georgia's State Performance Trials in South Georgia*, 2-Yr Ave, 2007-2008 (4Yr-Loc).

Entry	Yield * bu/A	Test Wt.** lbs/bu	Head Date** Julian	Height** inches
GA 991336-6E9	83.0b	60.5b	91b	38ab
GA 991371-6E12	85.2ab	60.0b	91b	38ab
GA 991209-6E33	81.5b	60.8b	91b	39a
AGS 2020	86.7a	60.6b	92b	38ab
AGS 2035	86.7a	62.0a	91b	39a
AGS 2060	77.7c	62.7a	92b	39a
Coker 9553	73.3c	60.8b	95a	39a
Oglethorpe	80.3b	60.3b	96a	37b
PIO26R31	82.5b	60.0b	96a	34c

*Plains, Midville and Tifton
**Plains, Tifton, Griffin, and Calhoun
Numbers with same letters are not significantly different at the P=0.10.

Table 7. Average Performance of GA entries and Checks for Grain Yield in Georgia's State Performance Trials in Georgia, 2-Yr Ave, 2008-2009 (8Yr-Loc).

Entry	South bu/A	North. bu/A	Statewide bu/A
GA 991336-6E9	74.3b	88.8a	80.1a
GA 991371-6E12	76.4a	85.4ab	80.0a
GA 991209-6E33	72.7b	79.1cd	75.3b
AGS 2020	75.8b	76.1d	76.0b
AGS 2035	79.1a	73.3d	76.8ab
AGS 2060	74.7b	82.1bc	77.7ab
Coker 9553	65.0d	82.0bc	71.8c
Oglethorpe	69.7c	73.0d	71.0c
PIO26R31	64.5d	63.0e	63.9d

Numbers with same letters are not significantly different at the P=0.10.

Table 8. Average Performance of GA entries and Checks for Grain Yield in Georgia's State Performance Trials in Georgia, 2008 (4Yr-Loc).

Entry	South bu/A	North. bu/A	Statewide bu/A
GA 991336-6E9	78.1	97.7	85.9ab
GA 991371-6E12	81.4	93.8	86.3a
GA 991209-6E33	76.2	89.6	81.6abcd
AGS 2020	80.1	78.5	79.5cd
AGS 2035	84.4	79.5	82.5abc
AGS 2060	80.7	90.3	84.5ab
Coker 9553	73.3	85.7	78.3cd
Oglethorpe	77.1	97.9	81.4bcd
PIO26R31	76.6	78.4	77.3d
LSD (10%)	4.0	10.2	4.7

Numbers with same letters are not significantly different at the P=0.10.

Table 9. Average Performance of GA entries and Checks for Grain Yield in Georgia's State Performance Trials in Georgia, 2009 (4Yr-Loc).

Entry	South bu/A	North. bu/A	Statewide bu/A
GA 991336-6E9	70.5	79.9	74.2a
GA 991371-6E12	71.5	77.1	73.7ab
GA 991209-6E33	69.2	68.6	69.0d
AGS 2020	71.5	73.8	72.4abc
AGS 2035	73.8	67.1	71.1bc
AGS 2060	68.8	73.9	70.8cd
Coker 9553	56.7	78.3	65.4de
Oglethorpe	62.3	58.2	60.6f
PIO26R31	52.4	47.6	50.5g
LSD (10%)	2.3	3.0	4.3

Numbers with same letters are not significantly different at the P=0.10.

Table 10. Average Performance of GA entries and Checks in Georgia's State Performance Trials in South Georgia*, 2-Yr Ave, 2008-2009, (4Yr-Loc).

Entry	Test Wt.** lbs/bu	Head Date** Julian	Height** inches
GA 991336-6E9	58.3b	97ab	37bc
GA 991371-6E12	58.9a	98b	37bc
GA 991209-6E33	57.8c	96ab	39b
AGS 2020	57.9bc	95a	37bc
AGS 2035	59.3ab	97ab	39bc
AGS 2060	60.0a	95a	40c
Coker 9553	59.8ab	101c	39bc
Oglethorpe	58.1bc	101c	37b
PIO26R31	55.0 d	100bc	33a

***Plains, Midville and Tifton**

****Plains, Tifton, Griffin, and Calhoun**

Numbers with same letters are not significantly different at the P=0.10.

Table 11. Average Performance of GA entries and Checks in Georgia's State Performance Trials in South Georgia*, 2009.

Entry	Leaf Rust 0-9	Powdery Mildew 0-9	Stripe Rust 0-9
GA 991336-6E9	0.0a	1.5a	0.0a
GA 991371-6E12	0.0a	3.5bc	2.0a
GA 991209-6E33	0.0a	1.5a	2.0a
AGS 2020	1.0a	3.0b	--
AGS 2035	0.0a	5.5d	0.0a
AGS 2060	0.0a	4.5cd	--
Coker 9553	5.0b	1.5a	2.0a
Oglethorpe	1.5a	4.0bc	0.0a
PIO26R31	7.5b	1.0a	9.0b

Scale: 0 resistant and 9 susceptible

Table 12. Average Yield Performance (bu/A) of GA lines and Checks in Breeding Nursery, at Multi-Location, 2008.

Entry	PL GA	TV AL	AU AL	SV MS	Average
GA 991336-6E9	120.4	102.1	93.5	76.6	98.2a
GA 991371-6E12	117.8	99.5	93.4	76.9	96.9a
GA 991209-6E33	118.2	102.1	93.5	72.2	96.5a
AGS 2020	104.1	103.9	108.5	76.2	98.2a
AGS 2035	121.7	100.6	93.5	72.3	97.0a
PIO26R61	111.1	88.3	80.6	65.3	86.3b
AGS 2000	110.7	85.7	87.2	68.4	88.0b

Plain, Tennessee Valley, Auburn, Stoneville

Table 13. Average Yield Performance (bu/A) of GA lines and Checks in Breeding Nursery, at Multi-Location, 2009.

Entry	PL GA	TV AL	SV MS	Average
GA 991336-6E9	69.5	69.5	69.5	69.5
GA 991371-6E12	70.5	70.5	70.5	70.5
GA 991209-6E33	69.7	69.7	69.7	69.7
AGS 2020	64.5	64.5	64.5	64.5
AGS 2035	71.9	71.9	71.9	71.9

Plains, Tennessee Valley, Stoneville

Table 14. Average Performance of GA entries and Checks in Uniform Southern Soft Red Winter Nursery, 2008.

Entry	Yield bu/A	Test Wt. lbs/bu	Head Date Julian	Height inches	Lodging 0-9
GA 991336-6E9	74.2a	57.3bc	113ab	36ab	3.3a
GA 991209-6E33	76.8a	58.5ab	111b	37ab	2.7a
AGS 2000	73.6a	57.6bc	113ab	36ab	3.8a
PIO 26R61	69.3b	58.7ab	115ab	39a	2.3a
Coker 9553	73.9a	59.2a	114ab	37ab	2.4a
USG 3555	76.2a	56.7c	116a	34b	2.3a

21 locations in the Southern Region
Numbers with same letters are not significantly different at the P=0.05.
Scale: 0 resistant and 9 susceptible

Table 15. Average Agronomic Traits of GA lines and Checks in Uniform Southern Soft Red Winter Nursery, 2008.

Entry	Leaf Rust 0-9	Stripe Rust 0-9	Powdery Mildew 0-9	WSBMV 0-9
GA 991336-6E9	0.8a	0.3a	2.3a	7.0c
GA 991209-6E33	0.8a	1.3a	2.6a	5.0b
AGS 2000	1.0a	3.3b	2.0a	8.0c
PIO 26R61	2.4ab	1.0a	4.1c	0.0a
Coker 9553	4.2c	0.5a	1.4a	8.0c
USG 3555	3.0bc	0.3a	1.1a	0.5a

21 locations in the Southern Region
Scale: 0 resistant and 9 susceptible
Numbers with same letters are not significantly different at the P=0.05.

Table 16. Average Performance (bu/A) of GA lines and Checks in Uniform Southern Soft Red Winter Nursery, 2008.

Entry	AL	Bay AR	S. AR	FL	GR GA	PL GA	Ft IN	BR LA	WB LA	CL MS	NC	SC	TX
GA 991336-6E9	66	64	62	64	67	111	81	81	81	86	56	91	91
GA 991209-6E33	70	61	86	62	63	116	87	81	90	81	51	92	92
AGS 2000	70	55	89	55	68	105	78	79	80	71	56	85	85
PIO 26R61	61	43	76	64	88	96	74	64	67	80	59	76	76
Coker 9553	66	66	84	60	95	103	79	48	53	69	59	81	81
USG 3555	70	68	71	56	97	113	79	55	47	80	57	81	81

21 locations in the Southern Region

Table 17. Evaluation of lines as % fly infestation in the field to Hessian fly at Plains and Griffin, GA in 2007, 2008 and 2009*.

Entry	2007 Plains	2007 Griffin	2008 Plains	2008 Griffin	2009 Plains	2009 Griffin	2009 Tifton
GA 991336-6E9	0.0a	3.3a	0.0a	2.5a	3.3a	45.0b	0.0a
GA 991371-6E12	0.0a	6.7a	4.9a	20.0b	5.0a	12.5a	0.0a
GA 991209-6E33	0.0a	1.7a	0.0b	2.5a	5.0a	0.0a	0.0a
AGS 2020	0.0a	3.3a	20.2b	21.3b	47.0b	30.0b	--
PIO 26R61	5.0a	0.0a	0.0a	0.0a	1.1a	15.0a	0.0a
Coker 9553	23.3b	3.3a	15.9b	5.0a	51.1b	20.0b	--

Numbers with same letters are not significantly different at the P=0.01.
*** Highest level in 2009 was 61, 33, 100% for Plains, Griffin, and Tifton, respectively.**

Table 18. Average Agronomic Traits of GA lines and Checks in State Performance Trials, 2009.

Entry	AR*	South LA	North LA	Delta MS	NC**	VA
GA 991336-6E9	65.3	75.0	77.9	58.9	49.4	76
GA 991371-6E12	62.8	70.8	76.8	58.8	45.8	83
GA 991209-6E33	64.7	64.8	81.0	63.1	42.1	87
AGS 2020	--	70.6	76.0	52.4	--	--
AGS 2035	60.6	80.4	78.4	58.4	--	76
AGS 2060	65.6	68.6	75.7	57.5	--	--
Coker 9553	62.9	50.7	69.3	58.8	50.3	82
Oglethorpe	--	73.1	73.8	55.3	--	--
USG 3555	65.4	52.8	75.5	60.2	60.9	--
LSD (10%)	4.0	11.5	9.5	4.1		6

***Keiser, Marianna, Rohwer, Stuttgart**
**** Lenoir County**