APPLICATION FOR RELEASE OF:

☒ **CULTIVAR**
☐ **ASSOCIATE CULTIVAR**
☐ **GERMPLASM**
☐ **PARENTAL LINE**
☐ **GENETIC STOCK**

1. **Crop:** Soybean (*Glycine max* L. Merr.)

2. **Experimental no. or name**: G21-10769RR-T & G21-10782RR-G

3. **Pedigree and history:**

Both G21-10769RR-T and G21-10782RR-G originated from a cross of Tyrone (2) × Boggs RR. Tyrone (PI 601984) is a maturity group VII conventional cultivar historically used for forage production in the southern United States. It was developed and released by the USDA-ARS in 1997 (Devine et al., 1998) and is an F_4-derived line from the cross of PA4-11g1 × 'Ripley.' 'Boggs' (PI 602597), a MG VI cultivar, was derived from the cross of G81-152 × Coker 6738. Developed by the Georgia Agricultural Experiment Stations and released in 1997, Boggs was selected for its disease and nematode resistance as well as its high productivity (Boerma et al., 2000). Boggs RR is a backcross-derived cultivar from Boggs × Resnik (2) RR, with Resnik (2) RR carrying the CP4 EPSPS gene, conferring tolerance to glyphosate herbicide (Barry et al., 1997).

The initial cross of Tyrone × Boggs RR was made in the summer of 2016 at the University of Georgia J. Phil Campbell Farm in Athens, GA. BC_1F_1 seed was produced by backcrossing glyphosate-tolerant F_1 plants from the Tyrone × Boggs RR population to cultivar Tyrone in the winter of 2016–2017. In the summer of 2018, the BC_1F_2 generation was grown in the greenhouse in Athens, where leaf tissue samples were collected and genotyped using RR1 markers to identify homozygous RR1 plants. Subsequent phenotypic selection was conducted in the field from 2021 to 2023 at the University of Georgia (UGA) Iron Horse Farm near Watkinsville, GA.

In 2024, both G21-10769RR-T and G21-10782RR-G, along with the commercial checks AG72XF0 and AG738RR, were yield-tested in replicated plots at two locations in Georgia, with three replications per location. In the trial, the lines were top trimmed at similar height at the V4

and flowering stages, respectively using a hedge trimmer.

4. Description of plant material:

G21-10769RR-T has white flowers, tawny pubescence, an indeterminate growth habit, and tan pod walls. Its seeds have black hilum and yellow seed coats with a shiny texture. In contrast, G21-10769RR-G also has white flowers and an indeterminate growth habit but exhibits gray pubescence and tan pod walls. Its seeds have brown hilum and yellow seed coats with a shiny texture. Both G21-10769RR-T and G21-10782RR-G are maturity group VII cultivars. In the 2024 UGA Yield Trials, G21-10769RR-T and G21-10782RR-G were evaluated for yield, plant height, lodging, other agronomic traits and seed composition across two locations under different top-trimming treatments (Table 1).

- Yield performance: G21-10769RR-T (27.2 bu/ac) and G21-10782RR-G (22.6 bu/ac) yielded lower than commercial checks AG72XF0 (40.0 bu/ac) and AG738RR (41.9 bu/ac). Trimming at V4 or flowering stages further reduced yields (Table 1).
- Maturity & Height: G21-10769RR-T matured 26-36 days after September 1, while G21-10782RR-G matured 23-26 days. Heights ranged from 46.3 to 60.3 inches for G21-10769RR-T and 51.3 to 68.0 inches for G21-10782RR-G (Table 1).
- Lodging Resistance: Both lines showed moderate lodging resistance (Table 1).
- G21-10769RR-T has resistance to SCN race 3 and stem canker, and moderate resistance to southern root-knot nematodes and frogeye leaf spot, while G21-10769RR-G has resistance to southern root-knot nematodes and frogeye leaf spot and moderate resistance to stem canker (Table 2 and 3).
- Protein Content: G21-10769RR-T had the highest average protein content (37.1%), followed by G21-10782RR-G (36.8%). Both lines had a 2-3% higher protein content than commercial checks AG72XF0 (34.8%) and AG738RR (33.7%) (Table 4).
- Oil Content: G21-10769RR-T had an average oil content of 18.6%, comparable to AG72XF0 (18.5%) but slightly lower than AG738RR (18.9%). G21-10782RR-G had the lowest oil content (17.3%), below both checks (Table 4).

In summary: G21-10769RR-T and G21-10782RR-G exhibit stable agronomic traits but yield lower than commercial checks, particularly when top-trimmed. G21-10769RR-T and G21-

10782RR-G offer higher seed protein content than commercial checks but have slightly lower oil content, particularly G21-10782RR-G (Fig. 1).

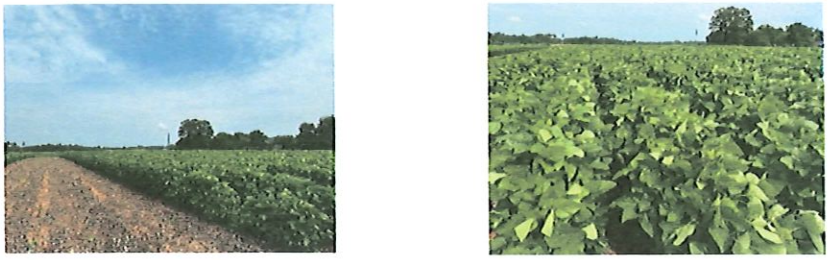

Figure 1. G21-10769RR-T & G21-10782RR-G seed increase at the University of Georgia J. Phil Campbell Farm in Watkinsville, GA in 2024

5. Need for and potential users of plant material:

Soybean (*Glycine max*) is a major source of edible vegetable oil and protein for both human consumption and livestock feed. However, weed management remains a significant challenge in soybean production, particularly in the southeastern USA. The development of herbicide-tolerant cultivars will provide soybean growers with effective weed control solutions, improving overall productivity.

In addition to its agricultural importance, soybeans also can serve as an excellent food source for wild animals such as deer, offering a balanced mix of protein, energy, and essential nutrients that support herd health and population growth. Due to soybean's high protein content and high palatability, deer readily consume both green plants and mature beans, making soybeans one of the most attractive food plot crops. Therefore, many land managers and hunters like to establish soybean food plots to ensure a nutritious, sustainable food source for deer throughout the year to enhance herd health and improve hunting success.

6. Justification for release:

While G21-10769RR-T (27.2 bu/ac) and G21-10782RR-G (22.6 bu/ac) yielded lower than commercial checks AG72XF0 (40.0 bu/ac) and AG738RR (41.9 bu/ac) but maintained yield stability across locations. With their indeterminate growth habit, both G21-10769RR-T and G21-10782RR-G provided a moderate-length growing season suitable for southeastern U.S. conditions. Both lines exhibited moderate lodging resistance, indicating good standability under field conditions. As glyphosate-resistant (RR1) cultivars, they offer soybean growers an

additional tool for effective weed control, which is a major challenge in southeastern U.S. soybean production.

Both G21-10769RR-T (37.1%) and G21-10782RR-G (36.8%) had significantly higher protein content than commercial checks AG72XF0 (34.8%) and AG738RR (33.7%), which provide a superior protein source for overall herd health in deer food plots. Both green plants and mature beans serve as highly attractive food sources for deer, making these lines ideal for wildlife managers and hunters seeking to improve herd quality.

Despite yielding lower than commercial checks, both G21-10769RR-T and G21-10782RR-G demonstrate fair agronomic stability, superior protein content, and herbicide tolerance. Their release will be serving as a valuable food source for deer and livestock, while also providing soybean growers with an effective weed management option.

7. Participating scientists:

Zenglu Li, Brian Little, E. Dale Wood, James Buck, and Melissa Mitchum

8. Location(s) at which plant material was developed:

University of Georgia, Athens, GA

9. Recommended form of intellectual property protection and royalty: PVP or Patent

References:

Boerma, H.R., Hussey, R.S., Phillips, D.V., Wood, E.D., Rowan, G.B. and Finnerty, S.L., 2000. Registration of 'Boggs' Soybean. *Crop science*, *40*(1), pp.294-294.

Devine, T.E., Hatley, E.O. and Starner, D.E., 1998. Registration of 'Tyrone' Forage Soybean. *Crop science*, *38*(6), pp.1720-1721.

Gerard F. Barry, Ganesh M. Kishore, Stephen R. Padgette, and William C. Stallings. 1997. Glyphosate-tolerant 5-enolpyruvylshikimate-3-phosphate synthases. US Patent **5,633,435** (granted in 1997)

APPLICATION FOR RELEASE

Application for the release of G21-10769RR-T & G21-10782RR-G Soybean (Glycine max L. Merr.) cultivar

After the application has been reviewed and approved by the Committee and requested changes have been made, please send the entire application through DocuSign, including this signature page. There are directions for establishing your own DocuSign account; the College OIT help desk will be able to help you if you run into issues establishing your account, or if you have other questions.

At the Add Recipients step, please be sure to **click on the signing order check box**, so that it goes for signature in the correct order. Use **Needs to Sign** for everyone below:

Release recommended by:

A. Signed by: Zenglu Li 7899B37079904EB... — 03/26/2025 | 3:29 PM EDT
Originating Scientist Zenglu Li — Date

B. DocuSigned by: Wayne Parrott FAF3B98C6853AEF... — 03/26/2025 | 3:30 PM EDT
Chair, GAES PCGRC — Date
This will be Wayne Parrott, wparrott@uga.edu

C. DocuSigned by: B25EB3E698BB409... — 03/27/2025 | 11:21 AM EDT
Department Head — Date
This will be either
- Jodi Johnson-Maynard, jlmaynard@uga.edu, or
- Leo Lombardini, lombardini@uga.edu, or
- Harald Scherm, scherm@uga.edu

Signature by the DH and Assistant Deans indicates that 1) the DH has reviewed the application with the executive committee and/or appropriate commodity committees as needed, and 2) the application has been reviewed to ensure that the genetic material was developed with GAES funds and that the application includes appropriate collaborators involved in developing the genetic material.

D. _____ — _____
For Griffin and Tifton, Assistant Dean — Date
This will be either
- Timothy Grey, tgrey@uga.edu, for Tifton, or
- Jeff Dean, jeffdean@uga.edu, for Griffin

E. Signed by: Harshavardhan Thippareddi DDA6A4D5BAA1451... — 04/07/2025 | 8:27 AM EDT
Associate Dean for Research — Date
- This will be Dr. Harsha Thippareddi, agresch@uga.edu
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Approved:

F. Signed by: Harshavardhan Thippareddi DDA6A4D5BAA1451... — 04/07/2025 | 8:27 AM EDT
Dean and Director — Date

Table 1. Yield and agronomic trait performance of G21-10769RR-T & G21-10782RR-G in the 2024 UGA Yield Trials across two locations

Name	Type	Growth habit	Treatment	Yield (bu/a)	Flower color	Pub Color	Pod wall	Mat d after Sept 1	Height Athens	Height Plains	Lodge Athens	Lodge Plains
G21-10769RR-T	**RR1**	**Indeterminate**	**No trimming**	**27.2**	**W**	**T**	**T**	**36**	**60.3**	**26.7**	**2.7**	**1.0**
G21-10769RR-T	**RR1**	**Indeterminate**	**Trimmed at V4 stage**	**22.5**	**W**	**T**	**T**	**27**	**55.3**	**25.3**	**3.0**	**1.0**
G21-10769RR-T	**RR1**	**Indeterminate**	**Trimmed at flowering stage**	**21.8**	**W**	**T**	**T**	**26**	**46.3**	**25.0**	**3.0**	**1.0**
G21-10782RR-G	**RR1**	**Indeterminate**	**No trimming**	**22.6**	**W**	**G**	**T**	**24**	**68.0**	**31.3**	**3.0**	**1.0**
G21-10782RR-G	**RR1**	**Indeterminate**	**Trimmed at V4 stage**	**23.6**	**W**	**G**	**T**	**23**	**60.3**	**30.0**	**2.3**	**1.0**
G21-10782RR-G	**RR1**	**Indeterminate**	**Trimmed at flowering stage**	**23.6**	**W**	**G**	**T**	**26**	**51.3**	**37.0**	**3.0**	**1.0**
AG72XF0	**XF CK**	**Determinate**	No trimming	40.0	W	T	T	40	42.7	19.3	1.3	1.0
AG72XF0	**XF CK**	**Determinate**	Trimmed at V4 stage	37.7	W	T	T	42	40.3	17.7	1.3	1.0
AG72XF0	**XF CK**	**Determinate**	Trimmed at flowering stage	34.2	W	T	T	34	39.0	20.0	1.0	1.0
AG738RR	**RR1 CK**	**Determinate**	No trimming	41.9	P	T	T	43	37.0	20.7	2.3	1.0
AG738RR	**RR1 CK**	**Determinate**	Trimmed at 4-leaf stage	35.4	P	T	T	43	34.0	15.3	2.0	1.0
AG738RR	**RR1 CK**	**Determinate**	Trimmed at flowering stage	40.8	P	T	T	42	31.3	20.3	2.3	1.0
Mean				30.9				33.8	47.2	24.1	2.3	1.01
LSD (0.05)				3.3				5.5	4.7	5.6	0.7	0.04

Table 2. Greenhouse Ratings of G21-10769RR-T & G21-10782RR-G for Resistance to Three Species of Root-Knot Nematode and Two Soybean Cyst Nematode HG types

			Root-Knot Nematode			Soybean Cyst Nematode	
Line ID	Herbicide Technology	Maturity Group	Southern	Peanut	Javanese	Race 3 (HG 0-)	Race 2 (HG 1.2.-)
G21-10769RR-T	RR1	MG VII	2.8	4.8	4.5	1	5
G21-10782RR-G	RR1	MG VII	1.5	5.0	4.3	5	5

Table 3. Greenhouse Ratings of G21-10769RR-T & G21-10782RR-G for Resistance to Frogeye leaf spot Southern Stem Canker

Line ID	Herbicide Technology	Maturity Group	Frogeye leaf spot	Southern Stem Canker
G21-10769RR-T	RR1	MG VII	3.0	1.0
G21-10782RR-G	RR1	MG VII	1.0	2.9

Table 4. Seed Protein and Oil contents of G21-10769RR-T & G21-10782RR-G

Entry	Type	Growth habit	Top Trimming Treatment	Protein Content (%)	Average Pro (%)	Oil Content (%)	Average Oil (%)
G21-10769RR-T	Line	Indeterminate	No trimming	37.0	37.1	18.5	18.6
G21-10769RR-T	Line	Indeterminate	Trimmed at V4 stage	36.9		18.9	
G21-10769RR-T	Line	Indeterminate	Trimmed at flowering stage	37.5		18.4	
G21-10782RR-G	Line	Indeterminate	No trimming	36.5	36.8	17.7	17.3
G21-10782RR-G	Line	Indeterminate	Trimmed at V4 stage	36.8		17.1	
G21-10782RR-G	Line	Indeterminate	Trimmed at flowering stage	37.0		17.2	
AG72XF0	Check	Determinate	No trimming	34.7	34.8	18.5	18.5
AG72XF0	Check	Determinate	Trimmed at V4 stage	34.6		18.7	
AG72XF0	Check	Determinate	Trimmed at flowering stage	35.0		18.4	
AG738RR	Check	Determinate	No trimming	34.0	33.7	18.9	18.9
AG738RR	Check	Determinate	Trimmed at V4 stage	33.5		19.1	
AG738RR	Check	Determinate	Trimmed at flowering stage	33.5		18.8	
Grand Mean				**35.6**	**35.6**	**18.3**	**18.3**
LSD 0.05				**0.96**	**0.96**	**0.55**	**0.55**

G21-10782RR-G

G21-10782RR-G is a Maturity Group VII, glyphosate-resistant variety. It has an indeterminate growth habit, white flowers, gray pubescence, and tan pod walls. The seeds of G21-10782RR-T have buff hila, ranging in color from light to dark buff, and yellow seed coats with an intermediate shiny texture.

G21-10782RR-G is resistant to southern root-knot nematodes and frogeye leaf spot and moderately resistant to stem canker. In 2024 yield trials, it exhibited 2-3% higher seed protein than the commercial checks AG72XF0 (34.8%) and AG738RR (33.7%).