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GRDB FL 15: A New Rice (*Oryza sativa* L.) Variety Released for Commercial Cultivation in Guyana

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Authors' contributions

This work was carried out in collaboration among all authors. Authors MP and NG designed and carried out the experiments. Author NG analyze the data and wrote the manuscript. All authors read and approved the final manuscript.

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ABSTRACT

Varieties determine the ultimate quantity and quality of produce. It acts not only as a carrier of technology but also sets upper limits of productivity, as built into its genetic architecture, the upper limit. The prime objective of the local rice breeding program is to develop varieties superior to the existing ones in terms of yield, tolerance to lodging, and excellent milling and cooking characteristics. The purpose of this trial was to evaluate the performance of a new rice genotype

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against one of the most dominant cultivated varieties in Guyana. As such, On-Farm trials were conducted with candidate variety FG12-49 (new rice genotype) in 27 farmers' fields/locations across the major rice-growing regions of Guyana during the second crop 2017 and first crop 2018 on plot size of 225m^2 and 0.4 – 2.02 ha (1-5 acres) respectively. This new genotype has conclusively demonstrated better: yield ability, tillering ability vigour, tolerance to lodging, stronger and thicker culms, slower leaf senescence, and more grains per panicle than the popular check rice variety GRDB FL 10. Data obtained showed that genotype FG 12-49 recorded a higher average grain yield and head rice recovery from paddy when compared to GRDB FL 10 in both cropping seasons: 2017- FL 12-49; 7299.0 kg/ha, GRDB FL 10; 6473.1 kg/ha with HRR% of 72.7% and 61.3% respectively; 2018 FL 12-49; 7249.1 kg/ha, GRDB FL 10; 6277.4 kg/ha with HRR% of 62.5% and 51.3% respectively. Genotype FG 12-49 was recommended for release countrywide for commercial cultivation as New Variety "GRDB FL 15".

Keywords: Rice variety; variety testing; genotype; trials; yield; cultivation.

ABBREVIATION

HRR : Head Rice Recover (expressed in per cent);
GRDB : Guyana Rice Development Board;

1. INTRODUCTION

Rice (*Oryza Sativa* L.) is one of the world most important food grain cultivated, ranked second to maze, feeding over half the planet population: predominantly in Asia, Africa, and South America, providing a primary source of calories and nourishment. Rice is not just grown as a food source, but also a livelihood for many, with significant economic and social impacts, including job creation opportunities and contributes to global food security. With global food security, sustainable development/ agriculture, climate change and the green revolution being the leading topic of discussion in the "Grow More" campaign, researcher and plant breeders around the world has and have been seeking alternative ways and means to improve existing varieties and or developing higher yield climatized varieties (Zibaee, 2013). The ultimate objective of crop breeder is to develop varieties with higher yielding potential and desirable agronomic and morphological characteristics (Khan, 2015). In China although rice cross breeding has made rapid progress since the 1980s; rice production has increased by 59% despite the decline in arable land (Wang, 2022).

After the second world war there were a desperate need for food globally, thereby creating a shift from traditional breeding to more established modernized research, hence the creation of the International Rice Research Institute (IRRI) in the 1960s by the Rockefeller Foundation and Food Foundation (FF) (Hargrove *et al*., 2006).

For centuries, traditional breeding has accomplished elite varieties by selection genotypes with desirable traits such as; adaptability, diseases and pests' resistance and higher yield potential. Nevertheless, through conventional breeding, rice breeders have efficaciously developed improved rice varieties with enhanced yield attributes; increase of grain numbers on panicle, number of spikelets, and length of the panicle which contributes significantly to the overall increase in yield for new varieties (Sabar, 2024).

In Guyana, rice is the leading foreign exchange earner in the Agricultural sector (Seoraj, 2021). It is grown seasonally on approx. 100,000 hectares of lands in Guyana, which keep increasing every crop with a national average yield of around 6 tones ha^{-1}. In order to satisfied the growing demands for this staple crop, an organized breeding program was coined by the Guyana Rice Development Board (GRDB). This rigorous breeding program focuses on increasing the yield, stability, quality, and nutrition of rice while also providing a crop that can be cultivated on all the rice growing Regions in Guyana, while combating the harsh climatic conditions (flash flood and short dry spell), (Persaud *et al*., 2024). The ultimate aim of the rice breeding program is to develop varieties superior to the existing ones in yielding ability, disease resistance, tolerance to lodging, excellent milling and cooking characteristics.

The demand for rice is projected to increase faster than the rate of yield increase, and rice production needs to be doubled to meet the demand of the world's inhabitants by 2050. Despite the enormous efforts to develop high-yielding varieties, breeders are facing the challenge of breaking the yield barriers (Ata-Ul-Karim et al., 2022). The ultimate aim of the rice breeding program is to develop varieties superior to the existing ones in yield, disease resistance, tolerance to lodging, and excellent milling and cooking characteristics. Depending on the target traits, improvement of the nutritional value of rice varieties can be achieved through conventional breeding approaches or using more advanced technologies such as double haploid breeding, molecular marker-assisted selection, and genetic engineering (Sitaresmi et al., 2023; Madishetty et al., 2023).

The release of a new genotype as a variety is based on a conclusive demonstration of its superiority over the most pronounce existing variety (included as a check in the evaluation trials - GRDB FL 10) in yielding ability or some other feature of economic importance, such as disease resistance, tolerance to lodging, quality traits, etc.

The selection of a candidate lines is a rigorous and tedious process where various testing methods are used, and keen observations are made over many years before a new variety is developed. The final stage of testing before a variety is released for commercial cultivation is done in farmers' fields across the major rice-growing regions in Guyana. This is done to test their adaptability in various conditions (soil types, climatic conditions, etc.) and the acceptability by farmers. The trial also serves to provide feedback on the farmers' preferences for the creation and development of newer candidate varieties.

After two successful rounds of testing in farmers' fields during the second crop of 2017 and the first Crop of 2018, the candidate variety (FG12-49) was released for commercial cultivation as GRDB FL 15 by the farmers in Guyana.

2. MATERIALS AND METHODS

The final evaluation of the performance of new genotypes of paddy before possible release as a variety is conducted in farmer’s fields across the major rice-growing regions of Guyana. As such, twenty-seven (27) farmers were selected to participate in this On-Farm Testing of the candidate variety (GRDB FL 15) during the autumn crop of 2017 and spring crop of 2018. The plot size for each trial in the first crop was 225m^2 and 0.40 - 2.02 ha (1-5 acres) for the second crop. In this trial, the most popular and high-yielding rice variety (GRDB FL 10) was used as the check variety for comparison. All the standard recommended agronomic practices were followed closely i.e., seed rate at 157.2 kg/ha, Urea at 185 kg/ha, Potash 84 kg/ha, TSP at 84 kg/ha, control for weeds, pests and disease at the GRDB recommended rates and timings. Field sanitation and routine husbandry practices were followed throughout the duration of the trial.

The characterisation of candidate variety (FG 12-49) for morphological, agronomic and milling traits was done at Rice Research Station Burma, Mahaicony, East coast Burma. These traits were studied over two independent seasons during 2017. Single panicle selections taken from the pre-basic seed plots were used to establish 100 progenies of each variety in the nursery. Seedlings at twenty-one days old were uprooted and transplanted in the field. In the field each progeny was represented by two rows (25 plants / row) with a spacing of 20cm within rows and 40 cm between rows. The normal routine husbandry practice was followed according to GRDB standard recommended agronomic practices.

2.1 Breeding Details

Testing Designation: FG 12 - 49

Breeding Designation: FL10915-2P-4-2P-1P-M

Parentage: FL07175-1P-1-3P-1P / FL04648-6P-9-1P-3P-M//FL04574-1P-4-3P-1P-M

Breeding Method: Introduction and Selection

Proposed Name of Variety: GRDB FL 15

Breeders: Mahendra Persaud (GRDB), Edgar Corredoer (FLAR)

2.2 Data Collection

In the two experimental plots, three squares of 5 m^2 each were selected randomly, and several agronomical and morphological parameters were evaluated. Data on plant height, productive tiller per meter square, lodging incidence, grain yield (kg/ha), panicle length, fertility and 1000 grain weight of rice were measured, collected and recorded for the candidate and the check variety cv. GRDB FL 10. The general guideline for data collection and documentation of various characters is the Standard Evaluation System for Rice (2013. IRRI. SES Standard Evaluation System for Rice, 2018).

2.3 Statistical Analysis

The variance of data was analysed using analysis of variance (ANOVA) with Statistix 10 software, and grand mean values for traits were compared according to the Least Significant Difference (LSD) statistical test.

3. RESULTS AND DISCUSSION

3.1 On-Farm Trials

In this study, the performance of a candidate variety (FG 12 - 49) of paddy was tested against one of the most popular and high-yielding commercial varieties (GRDB FL 10) on 27 farms in Guyana's rice cultivation. The data collected over the two seasons from the on-farm trials were analysed and discussed below.

3.1.1 Grain yield

Grain yield is the single most important trait of interest for the farmers. As shown in Table 1, while testing these two genotypes in farmer fields across the country; the check variety obtained a grain yield ranging from 3607.00 kg/ha to 11016kg/ha while the candidate variety obtained yield range between 3994.5kg/ha to 9882.7kg/ha. During the two seasons (Autumn 2017 and Spring 2018), the check variety produced an average yield of 6473.1kg/ha and 6277.4kg/ha while the candidate variety produced an average yield of 7299.0kg/ha and 7249.1kg/ha respectively. As shown in Table 2, in both seasons the candidate variety yielded a significantly higher grain yield than the check variety with a difference of 826kg/ha and 971.7kg/ha respectively. These differences translate to a 12 % yield advantage for the candidate variety in both seasons. Also, in Spring 2018 both genotypes yielded less when compared to the previous season and a more pronounced decrease in yield can be seen in the check variety while the Candidate variety maintained a more constant yield. Persaud *et al.,* 2022 also reported similar results on these genotypes.

3.1.2 Panicle length

The panicle lengths of samples from the two entries were measured and the mean ranged from 23.33cm to 28.60cm was observed over the two cropping seasons (Table 2). It was observed that the check variety produces longer panicles than the candidate variety in both seasons. In the autumn season, GRDB FL 10 recorded significantly longer panicles than the candidate variety while no significant difference was found in the Spring season. In 1990, Idris & Matin, (1990) reported that panicle length is influenced by variety.

3.1.3 Grain weight

As indicated in Table 2, the candidate variety produces grain with lower weight as compared to the check variety in both seasons. The average grain weight for the candidate variety ranged between 24.5g to 26.36g while the check variety ranged between 28.52g to 28.60g. Data indicated that in the first season, there was a significant difference in grain weight in favour of the check variety while there was no significant difference in the second season. These results were in line with the findings of Howlader *et al.,* 2017, who stated that the genetic makeup of a variety may have contributed to the variation in the thousand-grain weight. Heavier grains certainly contribute to higher yields.

3.1.4 Lodging

It was observed that during the two seasons, the check variety showed a significantly higher tendency to lodging as compared to the candidate variety. The candidate variety showed an average lodging tendency of 0% over the two seasons while the check variety showed an average of 36.4 % and 13.58% lodging in Autumn and Spring respectively. Rice varieties that are tolerant to lodging is of significant economic benefit for farmers in Guyana as the losses are both quantitative and qualitative. The local conditions favour lodging of high-yielding varieties at maturity especially during rain and delayed harvesting. Shahidullah *et al*., 2009 state that plants sensitive to lodging are not desirable because they will lodge and ultimately reduce grain yield.

3.1.5 Plant height

During the two testing seasons, the mean plant height was recorded between 98.44cm and 110.58cm. For the first season of testing, the check variety recorded a significantly taller plant height than the candidate variety while there was no significant difference during the second round. Data shows a clear indication that the plants grew slightly taller in the Autumn season compared to the Spring season. Plant height is an important growth parameter for any crop since it defines or alters yield contributing traits, which in turn gives grain production (Reddy *et al*., 1997). According to Ashrafuzzaman *et al.,* 2009, plant height is determined by the genetic makeup of the cultivar, however other factors can also influence this attribute as seen in the data presented

Table 1. List of farms that participated in the On-Farm Trial with the yield obtained for the check and candidate variety

SN	Farmer	Region	Location	Yield (kg/ha)			
				Autumn 2017		Spring 2018	
				FG12-49	GRDB FL 10	FG12-49	GRDB FL 10
1	Rafeek Khan	2	Anna Regina	8728.6d	8467.0c	6445.7jkl	5677.0fg
2	Ramnaresh Ramnauth	2	Hibernia	9883.7a	11016.0a	7413.6fghi	6766.0cde
3	Davendra Singh	2	Suddie	7116.8ij	5806.0h	7636.9defgh	8130.0b
4	Deoram Prahalad	2	Hibernia	5972.5lm	5234.0i	7352.4ghi	7177.0c
5	Rajendra Singh	2	Cullen	9332.8b	5437.0i	8404.9abc	3736.0h
6	Y. Sahdeo	3	Wakenaam	7003.9ijk	4197.0l	7153.0hij	7145.0c
7	Gandhi	3	Leguan	7682.2f	6206.0g	6962.6hijk	5454.0g
8	Jeetlall Ramraj	3	West Coast Demarara	6948.1jk	5323.0i	6105.4l	6130.0defg
9	Ganga Persaud	3	Hague	8799.9d	7643.0d	8750.2ab	6091.0efg
10	Birdo Persaud	3	West Coast Demarara	6149.7l	4740.0jk	8305.5bcd	6765.0cde
11	Anthony Sebastian	4	Hope	9143.3bc	9017.0b	7666.0cdefgh	6879.0cd
12	Jeewan Gobin	5	Mahaica Creek	3994.5q	4596.0jk	8072.3bcdefg	6069.0efg
13	Lincon Samaroo	5	Mahaicony Creek	8718.7d	8497.0c	5146.2m	6108.0efg
14	Rafel DeGroot	5	Fair Field	5275.3o	3873.0m	6283.4kl	5953.0fg
15	Shamshundar Ramrup	5	De Hoop	7642.3fg	6622.0f	6343.7kl	6319.0def
16	Carl Singh	5	Burma	7330.5ghi	6248.0g	5737.8lm	5462.0g
17	Brijdat Ramnarash	5	Letter T Village	6928.1jk	7043.0e	8584.4ab	6094.0efg
18	A. Crawford	5	Onverwagt	8153.2e	8337.0c	8209.3bcde	6064.0efg
19	Mohamad Rafeeoodeen	5	Washington	7647.9fg	6321.0fg	6892.4ijk	5659.0fg
20	Tulla Persaud	5	Bush Lot Village	7855.2ef	7741.0d	8140.2bcdef	8098.0b
21	Seenarine	5	Bath Settlement	5775.0mn	4233.0l	7556.0efghi	5533.0g
22	RRS	5	Cotton Tree Village	5633.7n	4475.0kl	7278.0hi	7518.0bc
23	Basdeo Sukanand	6	# 11 Village	6777.6k	4871.0j	4321.6n	3607.0h
24	Leekh Rambridge	6	Bengal Farm	7211.7hij	6997.0e	7551.3efghi	6013.0efg
25	Kenard Basdeo	6	Black Bush Polder	7530.9fgh	7432.0d	9074.9a	10279.0a
26	Lakeram Rahaman	6	# 52 Village	8927.0cd	8252.0c	6973.6hijk	4005.0h
27	BBP, Sub Station	6	Black Bush Polder	4910.9p	6153.0g	7363.3ghi	6758.0cde
Grand Mean				**7299**	**6473.1**	**7249.1**	**6277.4**
CV				**2.74**	**3.04**	**6.24**	**7.45**
P-value				**0**	**0**	**0**	**0**
F-Value				**156.9**	**241.63**	**18.05**	**25.7**

Table 2. Yielding character of the candidate and check variety over the testing period

SN	Autumn 2017				Spring 2018			
	Panicle Length (cm)	**1000 Grain Weight (g)**	**Yield (kg/ha)**	**Lodging (%)**	**Panicle Length (cm)**	**1000 Grain Weight (g)**	**Yield (kg/ha)**	**Lodging (%)**
FG 12 - 49	23.33b	24.50b	7299.00a	0b	22.87a	26.36a	7249.1a	0.00 b
GRDB 10	26.33a	28.52a	6473.10b	36.4a	24.48a	28.60a	6277.4b	13.58a
Grand Mean	**24.83**	**26.51**	**6886.10**	**18.20**	**23.68**	**27.48**	**6763.20**	**6.79**
CV	**2.85**	**2.25**	**0.23**	**21.45**	**9.29**	**7.17**	**0.98**	**4.45**
***P*-value**	**0.035**	**0.0143**	**0.0002**	**0.0076**	**0.4637**	**0.2977**	**0.0031**	**0.0003**
***F*-Value**	**27.00**	**68.37**	**4041.81**	**130.43**	**0.81**	**1.95**	**319.96**	**3029.46**

Table 3. Yielding character of the candidate and check variety over the testing period

SN	Autumn 2017				Spring 2018			
	Plant Height (cm)	**Effective Tiller**	**Grains/Panicle**	**Spikelet Fertility (%)**	**Plant Height (cm)**	**Effective Tiller**	**Grains/Panicle**	**Spikelet Fertility (%)**
FG 12 - 49	104.35a	387.78b	200.91a	81.65b	99.66a	359.96b	135.15a	84.64a
GRDB 10	110.58b	405.00a	127.26b	88.86a	98.44a	415.94a	86.60b	89.64a
Grand Mean	**107.47**	**396.39**	**164.09**	**85.26**	**99.06**	**387.95**	**110.88**	**87.14**
CV	**0.31**	**0.07**	**1.67**	**0.14**	**11.68**	**3.73**	**5.88**	**2.69**
***P*-value**	**0.0019**	**0.0002**	**0.0009**	**0.0002**	**0.9088**	**0.0419**	**0.0118**	**0.1209**
***F*-Value**	**527.11**	**6498.07**	**1085.80**	**5721.23**	**0.02**	**22.40**	**83.14**	**6.80**

for the two seasons. Local farmers prefer plant height of 100-110 cm as this facilitates both manual and mechanical husbandry operations. Tall varieties also tend to lodge easily along the windy coast belt.

3.1.6 Effective tiller

Over the testing period, the two tested rice genotypes recorded a mean effective tiller of 387.95 to 396.39 per square metre. The candidate variety produced more tillers in the first season than in the second one and the reverse can be seen in the case of the Check variety. As noted in Table 3, there is a similar trend for both testing periods where the candidate variety produces a significantly lower number of effective tillers than the check variety. Similar findings were reported by Hussain *et al.,* 2014 where they found that even though some rice variety produces more effective tillers than others the grain yield was lower.

3.1.7 Spikelet fertility

The mean percentage of spikelet fertility of the two genotypes tested ranged from 81.65 to 89.64. There is a slight increase in spikelet fertility from the first round as compared to the second round where in both instances the check variety (GRDB 10) registers a higher per centage of fertile spikelets over the candidate variety (GRDB FL 15). During the first season, the check variety showed a significantly higher spikelet fertility than the test entry, while no significant difference was found in the second season. Islam *et al.*, 2013 reported that the varieties that produced a higher number of filled grains per panicle showed higher grain yield per hectare. The candidate variety showed higher levels of unfilled grains which suggests that with higher grain filling can contribute to even higher grain yield

3.1.8 Grains per panicle

The candidate variety recorded a significantly higher number of grains per panicle when compared to the check variety in both seasons. In the first round of testing, the candidate variety recorded 200.91 grains per panicle while the check variety recorded 127.26 with an average difference of 73.65 grains more in favour of the candidate variety. Also, a similar trend was observed in the second round of testing where an average difference in the number of grain panicles was 48.55 which is slightly smaller than the previous season. The number of grains per panicle is one of the important yield-attributing traits in rice production and as shown in this experiment the number of grains per panicle can directly influence the grain yield per area. Grevois *et al.,* 1992 and Samonte *et al.,* 1998 also observed positive direct effects of filled fertile grains per panicle on rice yield.

3.1.9 Head rice recovery (HRR) – paddy

The Head Rice Recovery (HRR) is one of the top priorities for rice breeding (Zhao & Fitzgerald, 2013) meaning that varieties with a higher per centage of HRR attract higher market prices. In this experiment, HRR from Paddy indicated a significant advantage in the candidate variety over the check variety over the two testing seasons. The two genotypes produced higher HRR in the first season as compared to the second season with the candidate variety recording 72.70 and 62.53 per cent while the check variety recorded 61.33 and 51.31 per cent with an average difference of over 10% in favour of the candidate variety. These results are similar to Shi *et al.,* 2021, who studied seven rice varieties in China and found an HHR ranging from 59.82 per cent to 72 per cent. Taking into account that Guyana exports more than 70 % of its production, higher grain quality (HRR) is crucial to maximise on various market opportunities.

3.1.10 Chalkiness of endosperm

Regarding the chalky endosperm, there was no significant difference noted between the two genotypes over the testing periods; however, the candidate variety noted a slightly lower level of chalky endosperm during the second season when compared to the check variety. The candidate variety showed chalky endosperm of 0.30 and 0.16% while the check variety was 0.30 and 0.26% for the two seasons. The chalky endosperm of rice grain is an indicator of the grain quality. Wassmann *et al.* (2009) state that the milling qualities of rice are associated with chalkiness, immature kernels, kernel dimensions, fissuring, amylose content and amylopectin chain length. Cheng *et al*., 2005, and Zhao *et al*., 2013 also state that chalky endosperm influences consumer acceptability, cooking ability and milling quality. The candidate variety (FG 12-49) therefore showed a good indication of good grain quality.

Table 4. Milling character of the candidate and check variety over the testing period

SN	Autumn 2017		Spring 2018	
	% HRR Paddy	**Chalkiness (%)**	**% HRR Paddy**	**Chalkiness (%)**
FG 12 - 49	72.70a	0.30a	62.53a	0.16a
GRDB 10	61.33b	0.30a	51.31b	0.26a
Grand Mean	**67.02**	**0.30**	**56.92**	**0.21**
CV	**3.81**	**11.79**	**2.05**	**21.29**
***P*-value**	**0.03**	**1.00**	**0.007**	**0.0558**
***F*-Value**	**29.72**	**00**	**138.91**	**7.13**

Table 5. Characters evaluated of Candidate Variety (FG 12 - 49)

Characters	GRDB FL 15
Agronomic and Morphological	
Seedling Vegetative Vigour (Vg)	Extra vigorous
Tillering Ability (Ti)	Low (5 - 9)
Culm Strength (Cs)	Strong
Leaf Senescence (Sen)	Intermediate
Leaf Length (LL)	59 cm
Leaf Width (LW)	18 mm
Leaf Blade Pubescence (LBP)	Intermediate
Leaf Blade Colour (LBC)	Green
Basal Leaf Sheath Colour (BLSC)	Green
Leaf Angle (LA)	Erect
Flag Leaf Angle (FLA)	Intermediate
Ligule Length (LgL)	16 mm
Ligule Colour (LgC)	White
Ligule Shape (LgS)	Cleft
Collar Colour (CC)	Light Green
Auricle Colour (AC)	Light Green
Culm Length (CL)	80.6 cm
Culm Number (CN) per plant	7
Culm Angle (CmA)	Erect (<30°)
Diameter of Basal Internode (DBI)	5.6 mm
Culm Internode colour (CmIC)	Green
Panicle Type (PnT)	Compact
Secondary Branching of Panicles (PnBr)	Heavy
Panicle Axis (PnA)	Semi Upright
Panicle Exertion (Exs)	Well exerted
Panicle Treshability (PT)	Loose
Phenotypic Acceptability (PAcp)	Excellent
Awning (An)	Short and partly awned
Apiculus Colour (ApC)	Straw
Stigma colour (SgC)	Yellow
Lemma and Palea colour (MPC) [Grain Colour]	Straw
Lemma and Pubescence (LmPb)	Short hairs
Sterile Lemma Colour (SLmC)	Straw
Sterile Lemma Length (SLmL)	9.2mm
Days to Flowering	73 days
Days to complete Flowering	80 days
Dormancy (Days)	21 days
Maturity (Mat)	110 days
Disease	
Blast (*Pyriculariagrisea*)	Resistant
Brownspot (*Cochliobolusmiyabeanus (Bipolarisoryzae, Drechsleraoryzae*).	Moderately Resistant

Characters	GRDB FL 15
Sheath Blight (*Thanethoporuscucumeris* *(Rhizoctoniasolani*)	Moderately Resistant
Sheath Rot (*Soracladiumoryzae*)	Moderately Resistant
Grain	
Grain Length (GrL)	9.7 (mm)
Grain Width (GrW)	2.5 (mm)
Grain Shape (GrS)	Slender
Brown Rice Length (BrLn)	Long: 7.1 (mm)
Brown Rice Width (BrW)	2.3 (mm)
Brown Rice Shape (BrS)	Slender (over 3.0)
White Rice Length (WrLn)	6.5 mm
White Rice Width (WrW)	2.0 mm
1000 Grain Weight (GW)	26.6 g
Head Rice Recovery (HRR)- Paddy	61.30 (%)
Total Rice Recovery (TRR)- Paddy	67.60 (%)
Total Rice Recovery (TRR)- Brown	86.80 (%)
Grain Expansion- Length (GEL)	75.21 (%)
Grain Expansion- Width (GEW)	67.17 (%)
Cooking Time (White rice)	15-18 mins
Cooking Time (Parboiled)	18-20 mins
Alkali Spreading Value (ASV)	7.0

3.2 Characterization

Some of the important agronomic and morphological characters of genotype FG-12-29 studied over the two seasons are highlighted in Table 5. According to (2013. IRRI. SES Standard Evaluation System for Rice, 2018), the candidate variety can be characterised as an early duration (110 days) semi dwarf rice variety which possesses excellent early seedling vigour with low tillering ability and canopies very early. It has a strong and thick culm (stem) coupled with intermediate leaf senescence, which contributes positively to its ability to tolerate lodging. This genotype produces a very compact panicle with heavy secondary branching and 150-250 grains. This genotype produces a long, slender grain with very high milling yields (61.0% head rice recovery from paddy).

4. CONCLUSION

Candidate Variety (FG12-49) has demonstrated better yield ability, tillering ability, vigour, tolerance to lodging, stronger and thicker culms, slower leaf senescence, and more grains per panicle than the popular check rice variety (GRDB FL 10) in cultivation. The high head rice recovery (from paddy) and low levels of chalky endosperm indicate good grain quality. The conclusive demonstration of the superior performance of candidate variety across the country is a recommendation to be released as a new variety, GRDB FL 15, for commercial cultivation in Guyana.

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DISCLAIMER (ARTIFICIAL INTELLIGENCE)

The author (s) desires to clarify, that NO artificial intelligence (AI) language models such as NLP, ML, Deep Learning, Generative AL and or Elicit were used in the generation of this research article. All text and data analysis were conducted exclusively by the author (s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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