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Effect of Organic and Inorganic Fertilizer on the Growth and Yield Components of Traditional and Improved Rice (*Oryza sativa* L.) Genotypes in Malaysia

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Abstract: Rice is the most important staple cereal human nutrition and consumed by 75% of the global population. Rice plants need a supply of essential nutrients for their optimal growth. Rice production has increased tremendously in Malaysia insensitive irrigation and the use of inorganic fertilizers and pesticides. However, the effect of using inorganic fertilizers resulted in contamination of ground water and decreased the productivity of soil, which in turn affected the rice production in the long term. The use of organic manure may help to regain the soil health, but that is insufficient for providing the essential nutrients to achieve optimal growth. Therefore, the use of organic manure combined with inorganic fertilizers is applied to obtain optimum yields. This study aims to test the effect of organic and inorganic fertilizers on the growth and yield components of 65 rice genotypes. The pot experiment was conducted at the net house on field 10, University Putra Malaysia, UPM, Malaysia, during the period of February to June 2019 and August to December 2019 in a randomized complete block design (RCBD) with three replications. There were three treatment combinations viz. T_1: 5 t ha^{-1} chicken manure (CM), T_2: 2.5 t ha^{-1} CM + 50% CFRR, T_3: 100% (150 N: 60 P_2O_5: 60 K_2O kg ha^{-1}) and chemical fertilizer recommended rate (CFRR). Grain and straw samples were collected for chemical analysis, and physical parameters were measured at the harvest stage. Results showed that most of the growth and yield components were significantly influenced due to the application of organic manure with chemical fertilizer. The application of chemical fertilizer alone or in combination with organic manure resulted in a significant increase in growth, yield component traits, and nutrient content (N, P, and K) of all rice genotypes. Treatment of 2.5 t ha^{-1} CM + 50% CFRR as well as 100% CFRR showed a better performance than the other treatments. It was observed that the yield of rice genotypes can be increased substantially with the judicious application of organic manure with chemical fertilizer. The benefits of the mixed fertilization (organic + inorganic) were not only the crop yields but also the promotion of soil health, the reduction of chemical fertilizer input, etc.

Keywords: organic manure; crop productivity; rice; soil health; nutrient content

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1. Introduction

Rice (*Oryza sativa* L.) is a widely farmed food crop that provides sustenance for more than half of the world's population. "Rice is life" is the most appropriate slogan for the world, as this grain is critical to our national food security and provides a source of income for millions of rural people. Despite the enormous area under rice production, production is low due to a number of interrelated problems. One of the main causes of low production is an imbalance in fertilizer use, and the continued use of inorganic fertilizers has resulted in a decline in soil fertility. The use of inorganic fertilizers in conjunction with organic resources resulted in the highest grain and straw yields [1]. Using organic manure and chemical fertilizers in tandem would be very promising, not just in terms of increasing output stability but also in terms of improving soil fertility [2].

Organic manuring is becoming an increasingly significant part of environmentally healthy, long-term farming. Plant nutrients are replenished in agricultural soils primarily through inorganic, organic, and biofertilizers [3]. Inorganic fertilizers are used indefinitely, causing a decline in soil chemical, physical, and biological qualities, as well as soil health [4]. Chemical fertilizer's negative effects, combined with rising prices, have sparked a surge in interest in organic fertilizers as a nutritional source [4,5]. For sustainable agricultural production, the use of organic resources as fertilizers has obtained plenty of attention [6,7]. Organic materials have a plenty of potential as a source of numerous nutrients and as a method for improving soil properties [8].

However, due to the comparatively low nutrient content of organic manures, they may not be enough to meet the plant's needs. The application of organic manure with chemical fertilizer increases microbial activity, nutrient usage efficiency, and the availability of native nutrients to plants, resulting in increased nutrient uptake [9]. To obtain optimal yields, it is vital to employ organic manures in conjunction with inorganic fertilizers to provide the soil with all of the plant nutrients in easily available form and to maintain good soil health [10]. With a combination of safe modern technologies and traditional organic agriculture, which is not in its orthodox form, it has the potential to be approved for increased yields.

The use of organic manure in conjunction with chemical fertilizers has the potential to improve soil fertility and crop output. Integrated plant nutrition systems, particularly using organic manure, could improve crop productivity in intensive cropping systems. Organic manure has lately been discovered to be an excellent source of plant nutrients in the soil. Farmyard manure (FYM) and inorganic N and P fertilizers were used together to improve chemical and physical qualities, which could lead to increased and sustainable rice production [11]. Organic manure can provide a good amount of plant nutrients, which can help increase rice yield. As a result, in order to achieve a sustainable crop yield without depleting soil fertility, it is necessary to fertilize and manure in a coordinated manner.

Most cultivated soils in the world have less than 1.5% organic matter, although a good agricultural soil should have at least 2% organic matter. The use of organic manure in conjunction with chemical fertilizers can significantly boost rice output and soil productivity [12]. In a rice–rice cropping pattern, the integrated use of chemical and organic manure is critical for long-term crop productivity and soil fertility [2]. Soil organic matter boosts crop output by improving the physicochemical characteristics of the soil. Organic waste, farmyard manure, compost, and chicken manure have recently received attention as the most effective techniques for boosting soil fertility and thus crop output. Higher crop production necessitates a well-balanced mix of organic and inorganic fertilizer sources.

Inorganic fertilizers were employed with little or no addition of organic manure to generate increased rice yields. Even while inorganic fertilizers resulted in increased agricultural yields, the overuse of them was linked to deteriorated soil characteristics and degraded soils, resulting in lower yields in the future [13]. Chemical fertilizers, growth regulators, and pesticides are completely reliant on chemical fertilizers, growth regulators, and pesticides in the Western world to boost crop yield. Chemical fertilizer use has been linked to a number of negative health and environmental consequences [14]. Taking these factors into account, a middle ground between organic and inorganic fertilizer use for rice cultivation is necessary.

Chicken manure has been considered to be a soil additive to reduce the use of mineral fertilizers because it provides required nutrient amounts, increases cation-exchange capacity, and improves water-holding capacity. Chicken manure not only increases the yield of rice but can also substitute chemical fertilizers to some extent.

However, the use of organic manure alone might not meet the plant requirement due to presence of a relatively low content of nutrients. The application of organic manure with chemical fertilizer accelerates the microbial activity, increases nutrient use efficiency, and enhances the availability of the native nutrients to the plants, resulting in a higher nutrient uptake. Therefore, in order to make the soil well supplied with all the plant nutrients in the readily available form and to maintain good soil health, it is necessary to use organic manure in combination with inorganic fertilizers to obtain optimum yields.

Therefore, the present research work was undertaken to investigate the effect of the combined application of organic and inorganic fertilizers on the growth and yield of traditional and improved rice genotypes.

2. Materials and Methods

2.1. Plant Material

A total of 64 traditional and improved rice cultivars were evaluated in this study. The cultivars were obtained from different sources. The genotypes names and origin are presented in Table 1. First, the seeds were dried under sunlight for 8 h before soaking in a Petri dish and being placed in a dark incubator for 2 days. After that, the germinated seeds were sown in the seed tray.

Table 1. Name, origin, grain size, shape, and status of sample of 64 traditional and improved rice genotypes.

Code No	Name of Genotype	Source Country	Grain Size and Shape	Status of Sample
G1	Pukhi	Bangladesh	MS	Traditional cultivar
G2	Panbira	Bangladesh	SB	Traditional cultivar
G3	Dharial	Bangladesh	MB	Traditional cultivar
G4	Utri	Bangladesh	MS	Traditional cultivar
G5	Luanga	Bangladesh	MS	Traditional cultivar
G6	Kaisa panja	Bangladesh	MS	Traditional cultivar
G7	Vandana	Bangladesh	MS	Traditional cultivar
G8	Dular	Bangladesh	MB	Traditional cultivar
G9	Sondhamoni	Bangladesh	MB	Traditional cultivar
G10	Hasikamli	Bangladesh	MS	Traditional cultivar
G11	Dumai	Bangladesh	MS	Traditional cultivar
G12	Parija	Bangladesh	MS	Traditional cultivar
G13	Kataktara	Bangladesh	MS	Traditional cultivar
G14	Balirdia	Bangladesh	SB	Traditional cultivar
G15	Binnatoa	Bangladesh	MS	Traditional cultivar
G16	Parangi	Bangladesh	MB	Traditional cultivar
G17	Chengri	Bangladesh	MS	Traditional cultivar
G18	Dhala saitta	Bangladesh	SB	Traditional cultivar
G19	Morich boti	Bangladesh	SB	Traditional cultivar
G20	Saitta	Bangladesh	MB	Traditional cultivar
G21	Lal Dular	Bangladesh	MS	Traditional cultivar
G22	Nayan moni	Bangladesh	MS	Traditional cultivar
G23	Kalabokra	Bangladesh	MB	Traditional cultivar
G24	HUA565	Philippines	MS	Improved cultivar
G25	Takanari	Philippines	MB	Improved cultivar
G26	Kachalath	India	MS	Traditional cultivar
G27	Wkhi1	Philippines	MB	Improved cultivar
G28	Hukurikul193	Philippines	MB	Improved cultivar
G29	ML6	Malaysia	LS	Breeding line
G30	ML9	Malaysia	LS	Breeding line
G31	Wanxiam-P10	Malaysia	MS	Traditional cultivar
G32	RENGAN WANG	Malaysia	LS	Traditional cultivar
G33	PETEH PERAK	Malaysia	LB	Traditional cultivar
G34	WANGI PUTEH	Malaysia	MB	Traditional cultivar
G35	KUNYIT	Malaysia	MS	Traditional cultivar
G36	GHAU	Malaysia	LS	Traditional cultivar
G37	LALAMG	Malaysia	MS	Traditional cultivar
G38	MGAWA	Malaysia	MS	Traditional cultivar
G39	SUNGKAI	Malaysia	MS	Traditional cultivar
G40	UGAN	Malaysia	LS	Traditional cultivar

Table 1. *Cont.*

Code No	Name of Genotype	Source Country	Grain Size and Shape	Status of Sample
G41	TADOM	Malaysia	MS	Traditional cultivar
G42	BANGKUL	Malaysia	MS	Traditional cultivar
G43	NMR151	Malaysia	LS	Improved cultivar
G44	NMR152	Malaysia	LS	Improved cultivar
G45	MR297	Malaysia	LS	Improved cultivar
G46	Putra 1	Malaysia	LS	Improved cultivar
G47	Putra 2	Malaysia	LS	Improved cultivar
G48	MR 303	Malaysia	LS	Improved cultivar
G49	MR 309	Malaysia	LS	Improved cultivar
G50	BR24	Bangladesh	MS	Improved cultivar
G51	BRRI dhan48	Bangladesh	MS	Improved cultivar
G52	BRRI dhan82	Bangladesh	MS	Improved cultivar
G53	BRRI dhan72	Bangladesh	MS	Improved cultivar
G54	BRRI dhan28	Bangladesh	MS	Improved cultivar
G55	BRRI dhan39	Bangladesh	MS	Improved cultivar
G56	BRRI dhan42	Bangladesh	MS	Improved cultivar
G57	BRRI dhan43	Bangladesh	MS	Improved cultivar
G58	BRRI dhan46	Bangladesh	SB	Improved cultivar
G59	BRRI dhan75	Bangladesh	MS	Improved cultivar
G60	BRRI dhan55	Bangladesh	MS	Improved cultivar
G61	BRRI dhan69	Bangladesh	MS	Improved cultivar
G62	B370	India	LS	Improved cultivar
G63	BINASAIL	Bangladesh	MB	Improved cultivar
G64	BINA dhan7	Bangladesh	MB	Improved cultivar

2.2. Site of Experimentation

The pot experiment was conducted in a net house at the field 10, University Putra Malaysia (UPM), Malaysia. The experiment was conducted in two seasons, the first season being from February 2019 to June 2019 and the second season from August 2019 to December 2019. Geographically, the place is located at about 3°02′ N latitude and 101°42′ E longitude with an elevation of 31 m from the sea level, and it is characterized by a humid tropical climate. Details of the weather information are presented in Table 2.

Table 2. Month-wise average of daily maximum temperature, minimum temperature, mean temperature, and rainfall at UPM during experimentation period from February to June (1st planting season) and from August to December (2nd planting season) 2019.

1st Planting				Rain Fall (mm)	2nd Planting				Rain Fall (mm)
Temperature (°C)					Temperature (°C)				
Month	Max.	Min.	Ave.		Month	Max.	Min.	Ave.	
February	35.52	26.23	30.88	118.76	August	33.48	25.57	29.53	114.76
March	35.34	26.18	30.76	119.45	September	33.24	25.34	29.29	120.39
April	35.48	26.14	30.81	120.62	October	32.72	25.11	28.92	232.73
May	34.75	25.77	30.26	121.58	November	32.66	24.82	28.74	235.41
June	34.60	25.63	30.12	121.74	December	31.54	24.59	28.07	242.93
Average	35.14	25.99	30.57		Average	32.73	25.09	28.91	
Total				602.15	Total				946.22

2.3. Experimental Design and Treatments

The experiment was conducted following a randomized complete block design with three replication on each treatment. Twenty-day-old seedlings of each test genotypes were transplanted, and two seedlings were used per hill in 45 cm diameter and 52 cm height plastic pot with 15 kg soil and 20 cm spacing between hills. There were three (3) treatment combinations with chicken manure (CM) and chemical fertilizer recommended rate (CFRR) for high goal (HYG) as follows—T_1: CM (5 t ha^{-1}), T_2: CM (2.5 t ha^{-1}) + 50% CFRR (NPK) and T_3: 100% CFRR (NPK).

2.4. Application of Fertilizer and Operational of Intercultural

Organic fertilizer was incorporated into the soil before crop establishment, while a compound fertilizer (NPK 2.16:1.89:0.79) was applied at the rate of 5 t ha^{-1}. Triple super phosphate and muriate of potash were applied during final pot preparation, and urea was applied in two split doses at 25 days after seeding (DAS) and at 55 DAS, to supply total recommended nutrient of 150 N: 60 P_2O_5: 60 k_2O kg ha^{-1}. Both organic fertilizer and chemical fertilizer were applied as prescribed by the treatments. Weeding and other management practices were performed as and when required. Irrigation was also conducted whenever required.

2.5. Soil Analyses

Initial soil samples were taken from the surface to a depth of 0–15 cm. The samples were air-dried and crushed to pass through a 2 mm (10 meshes) sieve after being free of weeds, plant roots, stubbles, and stones. After that, the samples were placed in clean plastic bags to be analyzed chemically and mechanically. Standard procedures were used to assess the physical and chemical qualities of the initial and postharvest soil samples in Table 3. The textural class was calculated by projecting the values for percent sand, percent silt, and percent clay to the Marshall's Triangular Coordinate following the USDA methodology, and the particle size analysis of the soil was performed by hydrometer method [15]. Organic matter was determined by Walkley and Black method [16], soil pH (1:2.5 soil-water) by glass electrode pH meter method [17], total N by semi-micro Kjeldahl method [18], available P by Olsen method [19], exchangeable K by flame photometer after extraction with 1N NH_4OA_c at pH 7.0 [20], available S by extracting soil samples with CaCl2, solution (0.15%), and by measuring turbidity by spectrophotometer [21] method and CEC by sodium saturation method [15].

Table 3. Physiochemical characteristics of the initial and postharvest soil sample at the pot experiment on over two planting seasons, 2019.

Soil Characters	Initial	After Crop Harvest					
		5 t/ha CM		2.5 t/ha CM + 50% CF		100% CF	
		1st Planting	2nd Planting	1st Planting	2nd Planting	1st Planting	2nd Planting
pH	5.9	6.01	6.03	6.02	6.03	6.0	6.01
EC (µS/cm)	54	57	59	61	64	63	67
CEC	16.72	17.23	17.83	18.54	19.36	19.22	19.48
Organic carbon (%)	0.67	0.71	0.74	0.76	0.81	0.77	0.80
Organic matter (%)	1.32	1.57	1.66	1.54	1.59	1.49	1.55
Total N (%)	0.07	0.09	0.12	0.11	0.14	0.15	0.18
Exchangeable K ($cmolkg^{-1}$)	0.28	0.31	0.33	0.33	0.37	0.36	0.39
Available P ($mgkg^{-1}$)	17.54	17.86	18.32	18.59	19.83	19.45	19.78
Sand	31.63	31.95	32.24	32.56	32.84	31.69	32.27
Silt	34.18	34.36	35.22	35.51	35.79	35.62	36.45
Clay	27.49	27.64	28.27	28.33	28.65	27.74	28.46
Soil texture	Clay loam	Clay loam	Clay loam	Clay loam	Clay loam	Clay loam	Clay loam

Chemical properties of the chicken manure (dry basis).

Properties	Percentage
N	2.16%
P	1.89%
K	0.79%

2.6. Plant Tissue Analyses

After harvest, plant samples were collected from each treatment, and the samples were separated into the shoot (above ground plant parts excluding the grains), root, and grain, after which they were oven-dried at 70 °C for 72 h. Oven-dried samples were ground in the laboratory using a Wiley hammer mill with 1 mm mesh size. The samples were analyzed for total nitrogen (N), phosphorus (P), potassium (K), calcium (Ca), and magnesium (Mg). The nutrients were determined using acid wet digestion method [22]. For the digestion process, ground samples of 0.25 g were transferred to clean 100 mL digestion flask, and 5 mL of concentrated sulfuric acid (H_2SO_4) was added to each flask. The samples were allowed to stand for 2 h, after which 2 mL of 50% hydrogen peroxide (H_2O_2) was added. The flasks were heated for 45 min at 285 °C and then allowed to cool. This process was repeated twice to let the digestion be clear (colorless). The flasks were then removed from the digestion block, cooled to room temperature, and made up to 100 mL with distilled water filtered through filter paper (Whatman no. 1). The digested samples were stored in plastic vials before analysis for N, P, K, Ca, and Mg. Nitrogen and potassium were determined with auto analyzer (AA) (Lachat instrument, Milwaukee, WI, USA), while potassium, calcium, and magnesium were determined using automatic absorption spectrometer (ASS) (Perkin Elmer, 5100, Waltham, MA, USA).

2.7. Obtaining the Data

The data on morphological, physiological, and yield characteristics were collected in this study, which includes the quantitative characters that can be counted or measured using specific measuring tools such as plant height (PH, cm), total number of tiller per plant (NT, no.), total number of panicle per plant (NP, no.), panicle length (PL, cm), number of filled grains per panicle (NFG, no), number of unfilled grains per panicle (UNFG, no), 1000 grain weight (TGW, g), grain yield per plant (YP, g), straw yield per plant (SY, g), harvest index (HI,%), and nutrient content (N, P, and K) of grain and straw samples.

2.8. Statistical Analysis

All evaluated data were analyzed by pooled statistical analysis software (SAS) version 9.4 to test for significant differences using the analysis of variance (ANOVA) procedure and least significant differences (LSD) ($p \leq 0.001$, 0.05) to compare among the significant characteristics mean using the Duncan's new multiple range test (DNMRT) [23]. Prior to running ANOVA, data were tested for normal distribution and homogeneity of variance. These were used to determine the level of variation of all observed traits, which was brought about by genotypes, seasons, treatments, genotypes by treatments, genotypes by seasons, and genotypes by treatments by seasons to determine the level of variations.

3. Results

3.1. Morphological Traits

3.1.1. Plant Height

Plant height at the time when the plant reaches maturity varied from genotype to genotype; there was a significant difference ($p \leq 0.01$) among the rice genotype, treatment, genotype by treatment, and genotype by season (combination of genotype and season) as presented in Table 4. Results indicated that the application of T_2 (2.5 t ha^{-1} CM + 50% CFRR) produced the tallest plant height recorded in kalabokra (G23) (171.39 cm) followed by Kataktara (G13), Kaisa panja (G6), Saitta (G20), Nayan moni (G22), Parija (G12), and Panbira (G2) (169.98, 169.68, 163.97, 163.87, 163.45, and 162.65 cm, respectively), which were significantly higher than other treatments except T_3 (100% CFRR), which had a similar plant height. The application of T_1 (5 t ha^{-1} CM) produced a shorter plant height recorded in BRRI dhan69 (G61), BRRI dhan46 (G58), BRRI dhan75 (G59), BRRI dhan42 (G56), BINA dhan7 (G64), BRRI dhan48 (G51), and BRRI dhan55 (G60) (114.77, 115.94, 115.99, 117.56, 117.74, 117.82, and 117.91 cm, respectively) was presented in Table 5.

Table 4. Pooled analysis of variance mean square of growth traits across two planting seasons.

Variable	DF	PH	NT	NFG	NUFG	NP	PL	1000-GW	YP	SY	HI
Replication with seasons (R)	4	188.37 **	21.66 **	1476.35 **	1110.73 **	12.53 **	7.87 **	7.79 **	1.71 **	86.66 **	0.01 **
Seasons (S)	1	137.78 **	227.57 **	1884.81 **	1146.12 **	147.20 **	0.46ns	5.68 **	75.21 **	124.79 **	0.01 **
Treatments (T)	2	2865.25 **	249.86 **	13191.15 **	3290.56 **	120.86 **	28.72 **	67.11 **	119.63 *	701.82 **	0.13 **
S × T	2	50.15 **	2.09 *	27.93 ns	34.96 **	9.04 **	16.95 **	1.10 **	5.76 **	16.10 **	0.01 **
S × R × T (Error a)	8	0.84 ns	14.25 **	22.98 ns	5.11 ns	11.28 **	4.04 **	1.09 **	1.17 **	9.76 **	0.00 ns
Genotypes (G)	63	3433.63 **	54.74 **	8967.37 **	1982.55 **	28.44 **	125.48 **	152.32 **	186.68 **	159.08 **	0.20 **
G × S	63	1.92 **	0.94 **	32.94 **	16.30 **	0.90 **	2.50 **	0.27 **	0.88 **	1.14 **	0.00 **
G × T	126	10.62 **	2.77 **	39.62 **	19.56 **	1.97 **	2.54 **	3.59 **	0.71 **	8.51 **	0.00 **
G × S × T	126	2.09 **	0.88 **	13.60 ns	4.96 **	0.82 **	2.27 **	0.20 ns	0.39 ns	0.83 ns	0.0 **
Error b	756	0.92	0.59	11.56	3.06	0.58	0.74	0.16	0.38	0.96	0.00

** = significant at $p \leq 0.01$, * = significant at $p \leq 0.05$, ns = not significant, DF = degree of freedom, PH = Plant height, NT = Number of tillers per plant, NFG = Number of filled grains per panicle, NUFG = Number of unfilled grains per panicle, NP = Number of panicles per plant, PL = panicle length, 1000-GW = 1000 grain weight, YP = Yield per plant, SY = Straw yield and HI = Harvest index.

3.1.2. Number of Tillers per Plant

The number of tillers per plant showed a significant difference ($p \leq 0.01$) among the rice genotype, treatment, genotype by treatment, and genotype by season (combination of genotype and season) as presented in Table 4. Results indicated that the application of T_2 (2.5 t ha^{-1} CM + 50% CFRR) produced a significantly higher number of tillers plant^{-1} recorded in Takanari (G25) (14.88) followed by Putra 1 (G46), MR297 (G45), Putra 2 (G47), BR24 (G50), BRRI dhan48 (G51), and BRRI dhan39 (G55) (14.67, 14.56, 14.55, 13.77, 13.74, and 13.73, respectively), which were significantly higher than other treatments except T_3 (100% CFRR), which had a similar number of tillers plant^{-1}. The application of T_1 (5 t ha^{-1} CM) gave the lowest number of tillers plant^{-1} recorded in RENGAN WANG (G32), KUNYIT (G35), Nayan moni (G22), Kataktara (G13), Panbira (G2), BANGKUL (G42), and Saitta (G20) (6.46, 6.56, 6.55, 6.72, 6.73, 7.37, and 7.46, respectively) was presented in Table 5.

3.2. *Physiological Traits*

Straw Yield per Plant and Harvest Index

Straw yield per plant and harvest index showed a significant difference ($p \leq 0.01$) among the rice genotype, treatment, genotype by treatment, and genotype by season (combination of genotype and season) as presented in Table 4. Results indicated that the application of T_2 (2.5 t ha^{-1} CM + 50% CFRR) produced a significantly higher straw yield recorded in BRRI dhan39 (G55) (28.73 g plant^{-1}) followed by BR24 (G50), BRRI dhan75 (G59), BRRI dhan72 (G53), and BRRI dhan48 (G51) (28.63, 28.43, 28.15, and 27.84 g plant^{-1}, respectively), and harvest index recorded in MR309 (G49) (0.73%) followed by Putra 1 (G46), BR24 (G50), MR297 (G45), and Putra 2 (G47) (0.73%, 0.72%, 0.70%, and 0.67%, respectively) were significantly higher than other treatments except T_3 (100% CFRR), which had a similar straw yield and harvest index. The application of T_1 (5 t ha^{-1} CM) recorded a lower straw yield in Kalabokra (G23), Vandana (G7), Kataktara (G13), Luanga (G5), and Panbira (G2) (15.18, 15.75, 16.44, 16.77, and 17.25), and harvest index recorded in RENGAN WANG (G32), Wanxiam-P10 (G31), BRRI dhan43 (G57), B370 (G62), and WANGI PUTEH (G34) (0.30%, 0.32%, 0.32%, 0.34%, and 0.35%, respectively) were presented in Table 6.

Table 5. Plant height and number of tillers per plant of 64 rice genotypes as influenced by treatment and genotype (pooled over two seasons).

Genotype (G)	Treatment (T)	PH (cm)								NT						
	1	137.14b		140.56b		145.81b		125.87b		9.33a		9.72b		7.56b		11.72a
G1	2	140.29a	G17	145.12a	G33	149.51a	G49	130.19a	G1	10.74a	G17	12.36a	G33	9.72a	G49	13.64a
	3	139.15ab		143.98a		145.6b		124.27b		10.25a		11.42ab		9.11b		12.48a
LSD(0.05)		2.96		2.67		2.99		2.38		1.88		1.92		1.11		1.45
	1	155.11b		145.65b		141.69b		119.92b		6.73a		10.36b		7.99b		11.56a
G2	2	162.65a	G18	149.17a	G34	144.25a	G50	122.64a	G2	7.42a	G18	12.62a	G34	9.26a	G50	13.73a
	3	156.81b		145.02b		143.69ab		120.19b		6.88a		11.37ab		8.79a		11.69a
LSD(0.05)		2.55		2.24		2.45		1.96		1.16		1.88		1.13		1.95
	1	136.84c		141.65a		138.04c		117.82b		8.38b		9.63b		6.56a		11.56b
G3	2	144.13a	G19	142.66a	G35	144.66a	G51	122.43a	G3	10.26a	G19	11.28a	G35	7.36a	G51	13.73a
	3	140.86b		143.12a		140.66b		120.61a		9.66ab		10.82ab		7.11a		11.89ab
LSD(0.05)		3.06		3.61		2.38		2.69		1.88		1.92		1.07		1.88
	1	143.69a		161.74a		139.14a		121.07b		9.37a		7.46b		8.27b		11.34a
G4	2	146.14a	G20	163.98a	G36	141.91a	G52	125.11a	G4	10.66a	G20	9.27	G36	9.72a	G52	12.63a
	3	144.34a		163.55a		130.61b		124.97a		10.37a		8.79ab		8.32b		11.88a
LSD(0.05)		2.98		3.1		2.9		2.05		1.62		1.62		1.1		1.83
	1	156.1ab		143.9b		136.5b		119.77b		8.45b		10.27a		9.45ab		11.74a
G5	2	160.08a	G21	150.05a	G37	140.57a	G53	123.5a	G5	10.73a	G21	12.44a	G37	9.68a	G53	12.59a
	3	154.63b		146.86b		141.04a		121.63ab		9.66b		11.56a		8.37b		11.28a
LSD(0.05)		4.12		3.04		2.72		2.97		1.45		1.88		1.11		1.74
	1	164.8b		159.69b		147.22b		118.05a		7.47b		6.56b		8.57a		11.46a
G6	2	169.68a	G22	163.87a	G38	153.49a	G54	120.74a	G6	9.52a	G22	8.88a	G38	9.27a	G54	12.38a
	3	163.82b		161.79ab		151.4a		110.01a		9.07b		8.52a		8.79a		11.88a
LSD(0.05)		3.35		3.78		3.14		3.1		1.16		1.17		1.07		2.44
	1	155.23b		164.45b		143.11b		118.39a		8.38a		8.33b		7.58a		11.38
G7	2	160.37a	G23	171.39a	G39	150.24a	G55	121.79a	G7	9.89a	G23	9.52ab	G39	8.55a	G55	13.73
	3	159.43a		169.75a		147.58a		121.5a		9.46a		9.27a		7.69a		11.69
LSD(0.05)		3.16		3.59		3.47		3.76		1.46		1.39		1.61		1.61
	1	141.71b		121.69b		140.05b		117.65b		9.73a		8.67b		8.67b		9.67b
G8	2	144.72a	G24	126.78a	G40	143.78a	G56	122.45a	G8	11.56a	G24	10.46ab	G40	9.62a	G56	12.61a
	3	142.04ab		124.61ab		140.42b		121.12a		10.74a		9.66a		8.93b		11.37a
LSD(0.05)		2.77		3.47		2.38		2.12		2.4		1.46		1.09		2.19
	1	144.1b		128.91b		149.51b		119.56b		8.45b		12.62a		7.66a		9.66a
G9	2	149.9a	G25	133.67a	G41	153.93a	G57	124.16a	G9	10.69a	G25	14.88a	G41	8.72a	G57	11.83a
	3	143.78b		131.15ab		150.76ab		121.09b		9.53ab		14.47b		8.33a		11.25a
LSD(0.05)		3.44		2.74		3.49		2.82		1.64		1.95		1.45		1.88
	1	140.26b		136.12b		147.1b		115.94b		10.55a		11.27b		7.37a		8.67b
G10	2	146.85a	G26	141.49a	G42	150.59a	G58	121.4a	G10	11.21a	G26	12.68a	G42	8.62a	G58	11.62a
	3	144.33a		137.78b		146.12b		122.01a		10.2a		11.85b		8.23a		9.56b
LSD(0.05)		2.71		1.9		2.89		3.34		1.13		1.89		1.61		1.72
	1	133.97c		140.68a		131.68b		115.99c		10.62a		8.23a		9.56b		11.72b
G11	2	141.99a	G27	143.55a	G43	137.73a	G59	121.33a	G11	11.83a	G27	8.99a	G43	12.62a	G59	13.67a
	3	137.92b		142.36a		131.68b		118.65b		10.75a		8.72a		11.38a		12.48ab
LSD(0.05)		3.17		2.96		2.71		1.75		1.59		1.82		1.13		1.52
	1	155.72b		137.12		127.26c		117.91c		8.32b		10.62ab		10.51a		8.62b
G12	2	163.45b	G28	143.41	G44	132.71a	G60	123.66a	G12	9.62a	G28	12.67a	G44	12.27a	G60	11.52a
	3	157.72a		139.04		130.17b		120.8b		8.78b		11.77b		11.89a		10.37a
LSD(0.05)		3.29		3.13		2.38		1.13		1.22		1.98		2.37		1.49
	1	165.87b		132.12b		128.46b		114.77b		6.72b		11.56b		12.71a		10.72b
G13	2	169.98a	G29	134.78a	G45	133.37a	G61	120.79a	G13	8.67a	G29	12.71a	G45	14.56a	G61	12.66a
	3	166.25b		133.54ab		126.07b		122.43a		7.26b		11.89b		13.44a		11.45b
LSD(0.05)		3.5		2.41		3.44		2.59		1.15		1.85		2.54		1.85
	1	141.7b		127.22b		126.94b		121.6b		9.86b		10.78b		13.62a		8.52b
G14	2	146.11a	G30	133.89a	G46	132.66a	G62	126.13a	G14	11.36a	G30	12.61a	G46	14.67a	G62	9.69a
	3	143.67ab		131.58a		131.18a		124.68ab		11.72a		10.92b		13.85a		9.28ab
LSD(0.05)		2.91		3.29		1.65		3.49		1.89		2.07		2.48		1.2
	1	143.19b		143.83b		125.98c		119.15b		8.56b		7.56b		12.61b		8.36b
G15	2	148.12a	G31	150.16a	G47	131.07a	G63	123.7a	G15	12.62a	G31	8.82a	G47	14.56a	G63	11.82a
	3	144.11b		145.89b		129.2b		121.09b		11.35a		7.64b		12.72ab		10.72a
LSD(0.05)		3.18		2.78		1.69		2.01		1.62		1.12		1.87		1.52
	1	145.75b		138.84b		122.77c		117.74b		9.26a		6.46b		10.61a		9.61a
G16	2	153.95a	G32	142.38a	G48	130.15a	G64	119.59b	G16	11.56a	G32	7.88a	G48	11.59a	G64	10.77a
	3	151.35a		140.18ab		125.84b		124.64a		11.21a		7.17ab		11.27a		10.28a
LSD(0.05)		3.15		3.18		2.91		2.8		2.71		1.12		1.94		1.87

In a column, means with similar letter (s) are statistically identical, and those with dissimilar letter (s) differ significantly as per 0.05 level of probability, T_1 = 5 t ha^{-1} CM, T_2 = 2.5 t ha^{-1} + 50% CFRR, T_3 = 100% CFRR, PH= plant height, and NT= number of tillers per hill.

Table 6. Straw yield and harvest index of 64 rice genotypes as influenced by treatment and genotype (pooled over two seasons).

Genotype (G)	Treatment (G)	SY (g)								HI (%)							
	1	22.82b		23.38a		19.53c		25.55a		0.57a		0.58b		0.42a		0.68a	
G1	2	24.63a	G17	24.85a	G33	23.48a	G49	27.38a	G1	0.57a	G17	0.56b	G33	0.47a	G49	0.66a	
	3	24.28a		24.17a		21.36b		25.38a		0.56a		0.65a		0.44a		0.69a	
LSD(0.05)		1.31		1.28		1.83		2.74		0.03		0.02		0.07		0.03	
	1	17.25a		22.95a		21.73b		26.33a		0.51a		0.63a		0.38a		0.68ab	
G2	2	18.73a	G18	24.89a	G34	23.67a	G50	28.63a	G2	0.54a	G18	0.6a	G34	0.39a	G50	0.67b	
	3	18.34a		23.78a		20.19b		27.16a		0.54a		0.65a		0.39a		0.71a	
LSD(0.05)		1.82		2.44		1.66		3.11		0.05		0.05		0.03		0.04	
	1	24.56ab		23.56b		19.2a		25.68b		0.52b		0.59b		0.42a		0.63b	
G3	2	25.38a	G19	27.45a	G35	23.45b	G51	27.84a	G3	0.54ab	G19	0.61b	G35	0.44a	G51	0.63b	
	3	23.68b		26.63a		20.63		27.07ab		0.58a		0.68a		0.46a		0.69a	
LSD(0.05)		1.69		1.81		1.81		1.66		0.06		0.03		0.06		0.03	
	1	23.67ab		17.48b		22.36b		27.34a		0.54b		0.51b		0.36b		0.62a	
G4	2	24.26a	G20	18.93a	G36	24.61a	G52	18.56a	G4	0.51b	G20	0.54ab	G36	0.41a	G52	0.63a	
	3	22.35b		16.88b		22.85b		27.22a		0.58a		0.59a		0.39a		0.63a	
LSD(0.05)		2.49		1.68		2.26		2.86		0.03		0.05		0.03		0.02	
	1	16.77b		22.62ab		19.63b		27.44a		0.47a		0.6a		0.48ab		0.64a	
G5	2	18.72a	G21	25.21a	G37	24.58a	G53	28.15a	G5	0.46a	G21	0.56a	G37	0.43b	G53	0.64a	
	3	18.58ab		21.46b		20.47b		27.8a		0.47a		0.57a		0.53a		0.67a	
LSD(0.05)		1.96		2.85		2.49		3.05		0.04		0.04		0.06		0.04	
	1	17.83ab		17.27b		18.53ab		25.46a		0.46a		0.51ab		0.44b		0.39a	
G6	2	20.35a	G22	20.84a	G38	20.74a	G54	27.39a	G6	0.39b	G22	0.5b	G38	0.44b	G54	0.42a	
	3	17.42b		17.11b		17.83b		25.28a		0.47a		0.56a		0.48a		0.45a	
LSD(0.05)		2.66		1.79		2.10		3.37		0.02		0.05		0.02		0.07	
	1	15.75b		15.18b		18.93b		27.16ab		0.44a		0.48a		0.37ab		0.6ab	
G7	2	18.33a	G23	19.34a	G39	23.45a	G55	28.73a	G7	0.49a	G23	0.44a	G39	0.35b	G55	0.57b	
	3	16.72b		16.78b		19.75b		26.38b		0.47a		0.49a		0.39a		0.63a	
LSD(0.05)		1.79		2.11		1.99		2.09		0.05		0.09		0.02		0.04	
	1	22.95b		26.56a		20.53b		26.56ab		0.52b		0.68a		0.45b		0.38b	
G8	2	25.74a	G24	27.43a	G40	22.39a	G56	27.44a	G8	0.55b	G24	0.68ab	G40	0.45b	G56	0.35b	
	3	23.56b		25.93a		19.63b		23.71b		0.6a		0.64b		0.51a		0.48a	
LSD(0.05)		1.72		2.24		1.98		2.89		0.02		0.04		0.04		0.06	
	1	24.53ab		22.97b		18.37b		24.78a		0.56b		0.64a		0.43a		0.36b	
G9	2	25.98a	G25	25.26a	G41	21.83a	G57	27.29a	G9	0.53b	G25	0.59b	G41	0.4a	G57	0.4b	
	3	23.37b		22.57b		18.97b		25.48a		0.62a		0.65a		0.44a		0.36a	
LSD(0.05)		2.44		2.22		1.67		3.08		0.03		0.04		0.04		0.02	
	1	22.89b		23.66a		18.35a		25.97a		0.59a		0.56a		0.42b		0.38a	
G10	2	25.57a	G26	24.39a	G42	20.54a	G58	27.45a	G10	0.54b	G26	0.54a	G42	0.42b	G58	0.39a	
	3	24.65a		22.83a		17.82a		26.88a		0.6a		0.57a		0.51a		0.39a	
LSD(0.05)		3.21		2.11		2.33		3.48		0.03		0.04		0.07		0.05	
	1	25.64c		19.37b		22.78b		27.37ab		0.55b		0.41a		0.37b		0.6b	
G11	2	21.52a	G27	21.19a	G43	25.26a	G59	28.43a	G11	0.63a	G27	0.43a	G43	0.38b	G59	0.6ab	
	3	18.86b		19.24b		21.83b		26.35b		0.64a		0.41a		0.43a		0.62a	
LSD(0.05)		2.33		1.64		1.84		2.21		0.05		0.03		0.02		0.02	
	1	17.44b		24.08a		21.67b		24.35a		0.49b		0.59a		0.41b		0.36b	
G12	2	21.55a	G28	25.56a	G44	24.87a	G60	26.56a	G12	0.43ab	G28	0.53b	G44	0.44b	G60	0.44a	
	3	20.74a		25.18a		22.36b		24.62a		0.53a		0.56ab		0.5a		0.44a	
LSD(0.05)		1.73		2.16		1.69		2.95		0.08		0.05			0.04	0.05	
	1	16.44b		18.24c		25.46a		24.83a		0.56b		0.51a		0.67a		0.37a	
G13	2	18.78a	G29	25.64a	G45	27.63a	G61	26.74a	G13	0.56b	G29	0.4b	G45	0.66a	G61	0.37a	
	3	17.52ab		22.86b		25.96a		25.16a		0.6a		0.43b		0.71a		0.36a	
LSD(0.05)		1.69		1.80		2.27		2.95		0.03		0.04		0.07		0.07	
	1	23.65b		20.75b		25.17a		22.36ab		0.58b		0.48a		0.68b		0.39a	
G14	2	25.85a	G30	25.34a	G46	26.73a	G62	26.53a	G14	0.58b	G30	0.37b	G46	0.65b	G62	0.35a	
	3	24.78a		24.27a		25.11a		24.72b		0.68a		0.48b		0.72a		0.36a	
LSD(0.05)		1.45		1.94		2.16		2.58		0.05		0.02		0.02		0.10	
	1	22.26b		22.67c		26.38a		22.87a		0.059ab		0.48a		0.65a		0.41a	
G15	2	25.63a	G31	26.61a	G47	26.77a	G63	23.56a	G15	0.056b	G31	0.34b	G47	0.66a	G63	0.42a	
	3	23.45b		24.78b		5.85a		22.45a		0.062a		0.35b		0.7a		0.43a	
LSD(0.05)		2.27		1.31		2.49		1.65		0.04		0.04		0.06		0.05	
	1	23.56a		20.75c		25.73a		22.53ab		0.58b		0.41a		0.63a		0.41a	
G16	2	24.78a	G32	22.45a	G48	26.63a	G64	25.26a	G16	0.57b	G32	0.33b	G48	0.65a	G64	0.44a	
	3	24.22a		25.36b		24.93a		22.67b		0.68a		0.35ab		0.66a		0.44a	
LSD(0.05)		3.28		2.48		2.93		2.58		0.04		0.07		0.03		0.04	

In a column, means having similar letter (s) are statistically identical and those having dissimilar letter (s) differ significantly as per 0.05 level of probability, T_1 = 5 t ha^{-1} CM, T_2 = 2.5 t ha^{-1} + 50% CFRR, T_3 = 100% CFRR, SY= straw yield per plant, and HI = harvest index.

3.3. Yield and Yield Contributing Traits

3.3.1. Number of Panicles per Plant and Panicle Length

In order to increase the grain yield, the most important aspect on the growth of rice is the panicle number per plant. There was a highly significant difference ($p \leq 0.01$) among the rice genotype, treatment, genotype by treatment, and genotype by season (combination of genotype and season) on number of panicles plant^{-1} and panicle length as presented in Table 4. Results indicated that the application of T_2 (2.5 t ha^{-1} CM + 50% CFRR) produced significantly higher numbers of panicles plant^{-1} recorded in HUA565 (G24) (12.18) followed by MR297 (G45), Putra 1 (G46), Putra 2 (G47), and BRRI dhan39 (G55) (11.37, 11.26, 11.16, and 110.61, respectively) and longest panicle length recorded in MR297 (G45) (27.49 cm) followed by Putra 1 (G46), BRRI dhan28 (G54), BRRI dhan48 (G51), and Putra 2 (G47) (26.98, 26.89, 26.86 and 26.55 cm, respectively), which were significantly higher than other treatments except T_3 (100% CFRR), which had a similar number of panicle plant^{-1} and panicle length. The application of T_1 (5 t ha^{-1} CM) recorded a lower number of panicles plant^{-1} in WANGI PUTEH (G34), Nayan moni (G22), Panbira (G2), Kataktara (G13), and RANGAN WANG (G32) (4.93, 5.28, 5.27, 5.72, and 5.75, respectively) and the shortest panicle length recorded in Kaisa panja (G6), Vandana (G7), Kataktara (G13), Kalabokra (G23), and Saitta (G20) (16.46, 17.16, 17.19, 17.20, and 17.43 cm, respectively) were presented in Table 7.

Table 7. Number of panicles per hill and panicle length of 64 rice genotypes as influenced by treatment and genotype (pooled over two seasons).

Genotype (G)	Treatment (T)	NP							PL (cm)							
	1	8.33a		8.27b		6.46b		9.37a		22.24b		22.66a		19.53a		25.47b
G1	2	8.59a	G17	10.42a	G33	8.21a	G49	10.52a	G1	23.16a	G17	23.12a	G33	20.26a	G49	25.96a
	3	7.28a		9.38ab		6.83ab		10.29a		22.39b		22.47a		26.13a		25.56b
LSD(0.05)		1.99		1.51		1.49		1.65		0.02		0.61		6.83		0.23
	1	5.28a		8.52a		4.93b		9.57a		17.46b		22.29a		20.23b		25.43a
G2	2	5.63a	G18	9.73a	G34	7.37a	G50	9.71a	G2	18.31a	G18	22.48a	G34	20.43a	G50	25.56a
	3	5.49a		9.45a		7.15a		9.28a		17.16b		21.91b		20.26b		25.27a
LSD(0.05)		1.16		1.99		1.17		2.85		0.30		0.27		0.16		0.24
	1	9.08a		8.15a		6.48a		9.28a		21.4b		21.46b		18.36b		26.36a
G3	2	8.27a	G19	9.24a	G35	6.64a	G51	10.09a	G3	22.33a	G19	22.27a	G35	19.03a	G51	26.79a
	3	7.82a		8.68a		6.71a		9.78a		22.06a		22.37a		18.86a		26.45a
LSD(0.05)		1.89		2.21		1.18		1.66		0.35		0.29		0.30		0.27
	1	7.56a		6.46a		7.38ab		8.75a		22.36b		17.43b		20.2a		26.52a
G4	2	8.37a	G20	7.38a	G36	8.44a	G52	10.24a	G4	23.27a	G20	18.33a	G36	20.35a	G52	26.4ab
	3	8.72a		7.19a		7.68b		9.68a		22.4b		17.29a		20.27a		26.23b
LSD(0.05)		1.65		1.63		1.17			1.91	0.39		0.31		0.35		0.18
	1	7.62ab		8.92a		8.26a		8.64ab		18.06b		21.36c		19.4a		25.73b
G5	2	8.37a	G21	9.66a	G37	8.53a	G53	9.72a	G5	19.37a	G21	22.23a	G37	19.94a	G53	26.08ab
	3	6.86b		9.45a		7.88a		7.89b		19.14a		22.01b		19.67a		26.26a
LSD(0.05)		1.50		1.51		1.19		2.01		0.41		0.14		0.63		0.36
	1	6.79b		5.28b		5.78b		8.85a		16.46c		18.1a		20.93a		26.39a
G6	2	8.57a	G22	6.74a	G38	8.18a	G54	9.29a	G6	17.38a	G22	18.36a	G38	21.12a	G54	26.86a
	3	7.83ab		7.46a		7.63a		8.46a		17.18b		18.3a		20.98a		26.47a
LSD(0.05)		1.19		1.17		1.18		1.51		0.22		0.38		0.42		0.31
	1	7.16a		6.78a		6.78a		9.27a		17.16b		17.2b		19.2a		25.43a
G7	2	7.34a	G23	7.59a	G39	7.65a	G55	10.61a	G7	17.78a	G23	18.26a	G39	19.87a	G55	25.88a
	3	7.22a		8.12a		6.66a		9.78a		16.89c		17.96a		19.62a		25.27a
LSD(0.05)		1.51		1.49		1.63		1.19		0.21		0.35		0.37		0.28
	1	8.28a		10.47a		7.56ab		6.93b		21.38c		23.2a		18.36a		22.28b
G8	2	9.13a	G24	12.18a	G40	8.73a	G56	9.57a	G8	22.54a	G24	26.13a	G40	19.65a	G56	23.56a
	3	8.66a		11.37a		7.53b		9.17a		22.28b		26.06a		19.36a		23.33a
LSD(0.05)		1.19		2.13		1.16		1.92		0.28		0.82		0.38		0.28
	1	7.26a		9.26a		7.12a		7.29b		22.38c		23.26a		20.35b		21.54c
G9	2	8.41a	G25	10.52a	G41	7.34a	G57	8.74a	G9	23.28a	G25	23.3a	G41	21.04a	G57	22.69a
	3	7.79a		8.69a		6.85a		7.68ab		22.76b		22.96b		20.76b		22.25b
LSD(0.05)		1.92		2.32		1.49		1.19		0.24		0.27		0.27		0.29
	1	7.19b		7.27b		7.83a		8.56a		23.46ab		22.36b		19.29b		20.47c
G10	2	9.35a	G26	9.43a	G42	7.19a	G58	10.28a	G10	23.75a	G26	22.96a	G42	19.86a	G58	21.28a
	3	8.29ab		8.48ab		6.96a		9.75a		23.49b		22.63b		19.49a		20.88b
LSD(0.05)		1.15		1.64		1.81		1.91		0.19		0.28		0.22		0.27
	1	7.57a		6.69a		8.23b		6.79ab		22.42c		19.06ab		18.75ab		25.38b
G11	2	8.62a	G27	7.33a	G43	10.17a	G59	7.45a	G11	23.36a	G27	19.43a	G43	19.67a	G59	25.89a
	3	8.31a		7.24a		8.64ab		5.83b		22.89b		18.96b		19.35b		25.68b
LSD(0.05)		1.99		1.16		1.79		1.65		0.29		0.41		0.62		0.28

Table 7. *Cont.*

Genotype (G)	Treatment (T)	NP							PL (cm)							
	1	7.02a		9.57a		8.75a		8.62ab		18.24c		22.23a		19.18a		22.28ab
G12	2	6.64a	G28	9.31a	G44	9.29a	G60	9.56a	G12	19.35a	G28	22.5a	G44	19.48a	G60	22.76a
	3	6.59a		8.64a		9.45a		8.48b		19.08b		22.36a		19.37a		21.75b
LSD(0.05)		1.48		1.99		1.66		1.66		0.32		0.27		0.21		0.39
	1	5.72b		10.73a		10.28a		8.27ab		17.19b		21.1ab		26.96c		23.06a
G13	2	7.46a	G29	9.46b	G45	11.37a	G61	9.49a	G13	18.27a	G29	21.4a	G45	27.49a	G61	23.48a
	3	5.68b		7.73c		10.28a		7.61b		17.3b		20.96b		27.25b		22.97a
LSD(0.05)		1.18		1.17		1.18		1.67		0.35		0.40		0.24		0.39
	1	8.11a		10.23a		10.68a		6.72b		22.33a		20.13b		26.35a		21.28a
G14	2	8.57a	G30	8.72ab	G46	11.26a	G62	7.48a	G14	22.46a	G30	21.1a	G46	26.89a	G62	21.67a
	3	8.52a		7.92b		9.87a		7.83ab		21.63b		20.36b		26.67a		21.13a
LSD(0.05)		2.2		1.79		2.23		1.19		0.60		0.39		0.49		0.41
	1	7.25b		5.88b		10.28a		6.67b		23.38a		19.26b		25.48b		22.38a
G15	2	9.43a	G31	6.63a	G47	11.16a	G63	9.18a	G15	23.29a	G31	20.3ab	G47	26.55a	G63	22.56a
	3	8.67ab		7.47a		10.46a		7.74ab		19.76a		26.2a		26.32a		22.29a
LSD(0.05)		1.97		1.18		1.79		1.91		0.56		0.91		0.25		0.28
	1	7.83a		5.75b		9.47a		7.33a		21.52b		20.33b		26.46a		23.07b
G16	2	9.35a	G32	6.49ab	G48	8.72a	G64	8.18a	G16	22.37a	G32	21.03a	G48	26.49a	G64	23.47a
	3	8.74a		6.82a		9.38a		8.43a		21.95a		20.4b		26.28a		23.11b
LSD(0.05)		2.31		1.18		1.51		1.9		0.288		0.33		0.33		0.35

In each column, means with similar letter (s) are statistically identical, and those with dissimilar letter (s) differ significantly as per 0.05 level of probability, T_1 = 5 t ha^{-1} CM, T_2 = 2.5 t ha^{-1} + 50% CFRR, T_3 = 100% CFRR, NP = number of panicles per hill, and PL = panicle length.

3.3.2. Number of Filled Grains and Number of Unfilled Grains per Panicle

The number of filled and unfilled grains had a significant difference ($p \leq 0.01$) among the rice genotype, treatment, genotype by treatment, and genotype by season (combination of genotype and season) as presented in Table 4. Results indicated that the application of T_2 (2.5 t ha^{-1} CM + 50% CFRR) was significantly higher on number of filled grains panicle^{-1} recorded in BRRI dhan48 (G51) (176.41) followed by HUA565 (G24), MR297 (G45), BR24 (G50), and Putra 2 (G47) (171.42, 171.26, 170.53, and 168.27, respectively), and a similar number of filled grains panicle^{-1} were produced in T_3 (100% CFRR). The application of T_1 (5 t ha^{-1} CM) recorded the lowest number of filled grains panicle^{-1} in TADOM (G41), Vandana (G7), GHAU (G36), MGAWA (G38), and Kataktara (G13) (85.39, 85.46, 88.45, 89.46, and 89.56, respectively). The application of T_1 (5 t ha^{-1} chicken manure) was significantly higher on number of unfilled grains panicle^{-1} recorded in BINASAIL (G63) (67.21) followed by BINA dhan5 (G65), GHAU (G36), RENGAN WANG (G32), and BINA dhan7 (G64) (65.32, 63.33, 63.27, and 62.70, respectively). The application of T_2 (2.5 t ha^{-1} CM + 50% CFRR) recorded the lowest number of unfilled grains panicle^{-1} in BRRI dhan48 (G51), Putra 1 (G46), Kachalath (G26), Kalabokra (G23), and Putra 2 (G47) (19.26, 20.71, 21.75, 21.87, and 24.22, respectively), and a similar number of unfilled grains panicle^{-1} also recorded in T_3 (100% CFRR) were presented in Table 8.

3.3.3. 1000 Grain Weight and Yield per Plant

When it comes to rice production, stable and high-yielding genotypes are necessary, and 1000-grain weight of grains is a measurement of grain size. Grain size multiplied by grain number results in a measurement of total yield of grain. Here, 1000-grain weight is expressed as an effective function of grain yield. There was a significant difference ($p \leq 0.01$) among the rice genotype, treatment, genotype by treatment, and genotype by season (combination of genotype and season) as presented in Table 4. Results indicated that the application of T_2 (2.5 t ha^{-1} CM + 50% CFRR) recorded 1000-grain weight in BRRI dhan48 (G51) (25.85 g) followed by BR24 (G50), Putra 2 (G47), BRRI dhan55 (G60), and BRRI dhan69 (G61) (25.77, 25.73, 25.62, and 25.57 g, respectively), which were significantly higher than the other treatments except T_3 (100% CFRR), which had a similar 1000-grain weight. Further, the application of T_1 (5 t ha^{-1} CM) produced the lowest 1000-grain weight observed in KUNYIT (G35), Kataktara (G13), Parija (G12), Nayan moni (G22), and Panbira (G2) (10.05, 14.26, 14.67, 15.58, and 15.70 g). The application of T_2 (2.5 t ha^{-1} CM + 50% CFRR) produced a yield plant^{-1} recorded in MR297 (G45) (17.34 g), followed by BR24 (G50), Putra 2 (G47), Putra 1 (G46), and BRRI dhan72 (G53) (17.32, 16.85, 16.81, and 16.78 g plant^{-1}, respectively), which were significantly higher than the other treatments except T_3 (100% CFRR), which had a similar yield plant^{-1}. The application of T_1 (5 t ha^{-1} CM) produced lower yield plant^{-1} observed in RANGAN WANG (G32), SUNGKAI (G39), Vandana (G7), Kalabokra (G23), and BANGKUL (G42) (6.15, 6.29, 6.34, 6.71, and 6.88 g plant^{-1}, respectively) were presented in Table 9.

Table 8. Number of filled grains and unfilled grains per plant of 64 rice genotypes as influenced by treatment and genotype (pooled over two seasons).

Genotype (G)	Treatment (T)	NFG									NUFG						
	1	121.28c		133.41a		99.72b		161.27a		32.27a		37.66a		62.67a		33.57a
G1	2	136.56a	G17	140.27a	G33	108.37a	G49	166.35a	G1	29.62a	G17	30.83b	G33	52.19b	G49	28.96b
	3	131.48b		133.64a		105.83ab		165.19a		34.56a		35.68a		54.73b		31.62ab
LSD(0.05)		4.15		7.35		6.69		6.88		7.59		5.45		5.39		4.89
	1	103.26b		124.57b		106.28b		164.19b		40.65a		46.58a		55.17a		30.51a
G2	2	114.18a	G18	139.36a	G34	113.22a	G50	170.53a	G2	35.58a	G18	40.84b	G34	45.2b	G50	26.38a
	3	111.09a		134.62a		110.15ab		168.48ab		38.77a		44.36ab		48.34b		30.08a
LSD(0.05)		6.06		6.35		5.7		5.61		6.73		5.66		5.85		4.31
	1	128.31c		141.28b		105.28a		172.28b		45.23a		36.73a		56.28a		21.88a
G3	2	141.05a	G19	150.32a	G35	112.31a	G51	176.41a	G3	40.64a	G19	30.65b	G35	48.47b	G51	19.26a
	3	134.63b		145.56b		105.57a		170.52ab		43.53a		36.44a		55.06a		22.64a
LSD(0.05)		5.84		5.2		7.87		5.16		6.55		4.61		4.41		6.77
	1	135.18b		106.34b		88.45b		165.27a		37.23a		46.28a		63.33a		36.32a
G4	2	147.34a	G20	117.28a	G36	102.63a	G52	167.22a	G4	28.79b	G20	40.86b	G36	55.72b	G52	32.18a
	3	142.29a		111.74b		94.57ab		165.19a		33.64ab		45.57ab		61.14a		35.76a
LSD(0.05)		5.11		5.11		8.31		5.88		5.86		5.57		5.17		4.8
	1	107.25c		145.36b		109.28b		160.18a		39.65a		27.53ab		41.56a		36.44a
G5	2	122.34a	G21	161.52a	G37	118.36a	G53	167.26a	G5	35.78a	G21	24.26b	G37	35.25a	G53	32.38a
	3	115.3b		157.38a		113.69ab		161.42a		40.59a		30.63a		40.05a		37.84a
LSD(0.05)		5.49		5.42		5.11		7.23		5.78		4.85		6.86		5.69
	1	94.57b		108.17b		89.46b		116.45b		46.33a		39.76a		53.28a		60.32a
G6	2	116.28a	G22	119.42a	G38	103.28a	G54	137.35a	G6	42.5a	G22	34.18a	G38	45.44b	G54	50.71b
	3	111.19a		111.27a		98.57a		131.25a		44.18a		37.67a		50.23ab		56.27ab
LSD(0.05)		7.38		5.07		6.06		7.38		5.46		5.67		6.55		5.68
	1	85.46b		96.28b		110.27b		152.19b		35.73a		25.36ab		38.22a		33.26a
G7	2	98.38a	G23	113.45a	G39	122.16a	G55	165.26a	G7	27.62b	G23	21.87b	G39	30.18b	G55	30.64a
	3	95.27a		109.63a		119.42a		163.09a		35.41a		29.44a		36.64ab		36.5a
LSD(0.05)		5.69		6.37		5.69		5.16		7.14		4.36		6.15		5.88
	1	128.38b		159.38b		105.56b		115.28c		40.5a		34.08a		47.32a		49.55a
G8	2	140.41a	G24	171.42a	G40	113.32a	G56	126.41a	G8	35.27b	G24	28.47a	G40	40.52b	G56	43.27b
	3	135.56ab		168.56a		118.24a		121.58b		40.18a		31.55a		45.71ab		46.09ab
LSD(0.05)		6.59		5.2		6.79		4.56		4.66		6.55		5.46		6.08
	1	123.34b		152.26b		85.39b		110.29b		34.25ab		39.61a		35.07a		41.25a
G9	2	133.29a	G25	161.54a	G41	103.18a	G57	122.34a	G9	32.4b	G25	33.56b	G41	30.44a	G57	42.76a
	3	132.42a		156.44ab		99.46a		113.56b		38.29a		35.73ab		33.76a		44.2a
LSD(0.05)		7.62		6.88		5.99		6.75		4.77		5.38		6.64		5.54
	1	137.57b		141.18b		94.28b		111.23b		26.33b		26.37a		50.3a		37.22ab
G10	2	146.63a	G26	150.28a	G42	110.42a	G58	122.31a	G10	30.45ab	G26	21.75a	G42	42.62b	G58	36.53b
	3	143.74ab		145.63ab		105.74a		115.4b		35.68a		25.47a		47.55ab		41.8a
LSD(0.05)		6.69		6.38		6.72		5.49		5.77		7.08		6.43		5.21
	1	133.28b		107.11b		113.67b		154.29b		48.54b		45.32a		41.25a		41.17a
G11	2	146.16a	G27	121.07a	G43	122.28a	G59	165.31a	G11	37.67a	G27	40.4a	G43	35.69a	G59	34.86a
	3	141.64a		118.37a		118.52ab		161.48a		52.48b		44.28a		41.52a		37.24a
LSD(0.05)		6.94		6.03		6.51		5.93		6.52		4.85		5.94		7.23
	1	93.74b		138.26b		103.19b		117.28b		42.07a		31.35a		52.73a		40.56ab
G12	2	111.47a	G28	150.32a	G44	116.28a	G60	128.31a	G12	36.85a	G28	28.73a	G44	40.45b	G60	37.32b
	3	104.28a		145.07a		112.43a		125.69a		41.37a		33.25a		45.11b		44.05a
LSD(0.05)		9.65		6.17		5.81		6.79		5.49		6.45		5.47		4.84
	1	89.56b		108.67b		162.18b		115.57b		52.35a		51.47a		33.28a		51.23a
G13	2	102.49a	G29	120.1a	G45	171.26a	G61	126.42a	G13	48.72a	G29	40.37c	G45	30.61a	G61	44.64a
	3	96.37ab		115.58a		167.52ab		121.37ab		53.21a		45.11b		35.67a		50.6a
LSD(0.05)		6.65		5.11		6.63		6.83		4.74		5.29		5.13		6.79
	1	132.17b		115.67b		156.35a		94.69b		36.55a		55.37a		24.44ab		60.38a
G14	2	141.34a	G30	126.45a	G46	162.41a	G62	111.26a	G14	35.27a	G30	45.28c	G46	20.71b	G62	53.2b
	3	135.27ab		122.73a		161.53a		107.56a		40.62a		50.71b		31.69a		56.31ab
LSD(0.05)		6.75		5.28		6.49		8.91		6.54		3.99		9.01		5.29
	1	138.26c		111.18b		162.46b		105.28b		32.42a		55.24a		25.35ab		67.21a
G15	2	152.19a	G31	120.34a	G47	168.27a	G63	113.28a	G15	30.58a	G31	51.62a	G47	24.22b	G63	61.08b
	3	143.53b		115.41ab		167.71a		110.73ab		34.66a		55.23a		29.84a		63.44ab
LSD(0.05)		5.15		4.93		5.19		7.71		7.53		5.04		4.57		5.81
	1	145.55b		102.72b		160.58a		115.26b		44.38a		63.27a		34.16a		62.7a
G16	2	157.48a	G32	111.33a	G48	164.27a	G64	123.62a	G16	39.64b	G32	51.77b	G48	31.62a	G64	55.27b
	3	152.37a		107.28ab		160.11a		118.58ab		42.49ab		56.83b		35.43a		61.32a
LSD(0.05)		5.41		5.99		5.86		6.59		4.57		5.93		5.36		4.98

In each column, means with similar letter (s) are statistically identical, and those with dissimilar letter (s) differ significantly as per 0.05 level of probability, T_1 = 5 t ha^{-1} CM, T_2 = 2.5 t ha^{-1} + 50% CFRR, T_3 = 100% CFRR, NFG = number of filled grains per plant, and NUFG = number of unfilled grains per plant.

Table 9. 1000-grain weight and yield per plant of 64 rice genotypes as influenced by treatment and genotype (pooled over two seasons).

Genotype (G)	Treatment (T)	1000-GW (g)								YP (g)							
	1	18.26b		20.18b		18.53b		24.33a		11.43b		12.33a		7.47b		15.51a	
G1	2	20.43a	G17	21.84a	G33	20.77a	G49	25.51a	G1	12.27a	G17	13.25a	G33	9.91a	G49	16.46a	
	3	18.79b		20.48b		19.82a		25.07a		12.04ab		12.78a		8.61b		16.08a	
LSD(0.05)		0.58		0.50		0.93		0.87		0.99		0.88		1.06		0.95	
	1	15.7a		19.55a		17.88c		24.76b		7.83a		12.89a		7.34b		16.19b	
G2	2	16.25a	G18	20.15a	G34	19.25a	G50	25.77a	G2	8.89a	G18	13.11a	G34	8.33a	G50	17.32a	
	3	15.89a		19.74a		18.76b		25.42ab		8.68a		13.82a		7.45b		17.05ab	
LSD(0.05)		0.41		0.36		0.67		0.81		1.29		1.64		0.52		1.09	
	1	19.77b		20.56a		10.05b		24.64b		11.37b		12.36a		7.49c		15.24a	
G3	2	21.43a	G19	21.11a	G35	20.68a	G51	25.85a	G3	12.51a	G19	13.16a	G35	9.58a	G51	16.29a	
	3	20.65b		20.73a		20.87a		24.79ab		12.11ab		12.77a		8.54b		15.89a	
LSD(0.05)		0.52		0.28		0.69		0.99		0.84		0.48		1.02		1.38	
	1	19.78a		15.82b		19.17c		24.88b		11.24a		7.82b		7.21b		15.12a	
G4	2	20.85a	G20	17.22a	G36	21.43a	G52	25.51a	G4	11.85a	G20	9.16a	G36	9.03a	G52	16.4a	
	3	20.16a		16.65ab		20.45b		25.2ab		11.47a		9.07a		7.89b		15.58a	
LSD(0.05)		0.65		0.67		0.48		0.69		1.11		0.59		0.99		1.74	
	1	17.67b		21.62b		18.52b		24.9b		7.02a		12.59a		8.44b		15.77a	
G5	2	18.25a	G21	22.56a	G37	19.34a	G53	25.48a	G5	7.99a	G21	12.86a	G37	9.65a	G53	16.78a	
	3	18.05a		22.2ab		19.06ab		25.26ab		7.68a		12.64a		9.5a		16.35a	
LSD(0.05)		0.64		0.76		0.57		0.56		1.23		1.71		0.79		2.25	
	1	16.72b		15.58c		19.65a		23.67b		7.39a		7.79b		7.39b		9.16a	
G6	2	17.85a	G22	17.22a	G38	20.45a	G54	25.45a	G6	7.56a	G22	9.32a	G38	8.17a	G54	10.33a	
	3	17.33a		16.46b		20.27a		24.97a		7.41a		9.06a		7.76ab		9.84a	
LSD(0.05)		0.61		0.64		0.62		0.73		0.75		0.63		0.71		1.09	
	1	16.35b		19.26b		17.88c		24.55b		6.34b		6.71a		6.29b		14.71a	
G7	2	17.51a	G23	20.83a	G39	19.74a	G55	25.45a	G7	7.75a	G23	8.55a	G39	7.36a	G55	15.43a	
	3	16.89b		20.35ab		18.92b		25.25a		6.89ab		7.68a		6.99a		14.89a	
LSD(0.05)		0.48		0.73		0.564		0.56		0.96		1.52		0.63		0.94	
	1	17.78c		24.35c		18.37b		23.52b		10.89b		13.64b		8.12b		8.67a	
G8	2	19.56a	G24	22.07a	G40	19.56a	G56	24.67a	G8	12.78a	G24	16.37a	G40	9.05a	G56	9.43a	
	3	18.58b		21.67b		18.84ab		24.11a		12.52a		16.22a		8.92a		9.07a	
LSD(0.05)		0.54		0.59		0.62		0.81		1.46		1.48		0.59		1.32	
	1	19.26ab		20.62c		17.66a		24.08b		12.3a		13.23a		7.21b		8.09b	
G9	2	20.72b	G25	24.18a	G41	18.16a	G57	25.33a	G9	12.88a	G25	13.89a	G41	7.94a	G57	9.27a	
	3	19.88a		21.66b		17.9a		24.95a		12.28a		13.54a		7.48ab		8.73ab	
LSD(0.05)		0.86		0.75		0.57		0.67		1.22		0.78		0.56		0.89	
	1	19.43c		20.56c		18.99a		23.85b		12.25a		12.03a		6.88a		8.97a	
G10	2	21.66a	G26	22.43a	G42	19.64a	G58	24.55a	G10	12.28a	G26	14.26a	G42	7.61a	G58	9.64a	
	3	19.76b		21.28b		19.13a		24.24ab		11.95a		13.68a		7.9a		9.02a	
LSD(0.05)		0.77		0.79		0.73		0.82		1.45		1.26		1.19		1.21	
	1	18.24c		18.37b		22.96b		24.62b		12.25a		7.22b		7.76a		14.73a	
G11	2	20.63a	G27	20.51a	G43	24.37a	G59	25.37a	G11	12.8a	G27	8.61ab	G43	8.37a	G59	15.56a	
	3	19.52b		19.67a		23.45ab		25.12a		12.56a		7.93a		8.03a		14.88a	
LSD(0.05)		0.74		0.69		0.61		0.48		1.16		1.18		0.82		1.82	
	1	14.67c		20.55b		22.51b		24.55b		7.67a		12.34a		8.17b		8.11b	
G12	2	16.43a	G28	24.62a	G44	24.36a	G60	25.62a	G12	7.98a	G28	12.89a	G44	9.76a	G60	10.18a	
	3	15.88b		21.58b		23.78b		25.23a		7.73a		12.57a		9.58a		9.27a	
LSD(0.05)		0.75		0.91		0.53		0.35		1.38		1.11		0.96		1.05	
	1	14.26c		20.32b		24.23b		23.86c		8.34b		8.39b		15.62a		8.33a	
G13	2	16.68a	G29	22.44a	G45	25.3a	G61	25.57a	G13	9.16a	G29	9.15a	G45	17.34a	G61	9.45a	
	3	15.32b		20.74b		24.87b		24.88b		9.4a		8.44b		17.11a		8.96a	
LSD(0.05)		0.64		0.67		0.57		0.38		0.79		0.62		2.64		1.34	
	1	19.88a		19.62b		24.17b		22.76b		12.48a		7.97b		15.36a		7.81a	
G14	2	19.72a	G30	23.53a	G46	25.43a	G62	23.94a	G14	12.85a	G30	8.83a	G46	16.81a	G62	8.44a	
	3	19.98a		20.66b		25.08a		24.26a		12.81a		8.31ab		16.16a		7.82a	
LSD(0.05)		0.82		0.86		0.64		0.99		1.27		0.64		1.92		1.71	
	1	18.64b		20.86b		24.54b		23.17b		11.92a		7.35b		15.46a		8.53a	
G15	2	19.56a	G31	22.23a	G47	25.73a	G63	24.36a	G15	12.93a	G31	8.06a	G47	16.85a	G63	9.14a	
	3	19.08ab		21.38b		25.18a		23.95a		12.17a		7.83ab		16.52a		9.02a	
LSD(0.05)		0.93		0.71		0.74		0.83		1.22		0.54		2.22		1.45	
	1	19.55b		20.18b		24.18b		23.65b		12.23a		6.15b		14.8a		8.48b	
G16	2	20.45a	G32	21.36a	G48	25.32a	G64	24.57a	G16	12.58a	G32	7.76a	G48	15.52a	G64	10.46a	
	3	20.13ab		20.57b		24.67ab		24.21ab		12.37a		7.11ab		15.26a		10.23a	
LSD(0.05)		0.63		0.62		1.01		0.73		1.72		1.04		0.77		0.77	

In each column, means with similar letter (s) are statistically identical, and those with dissimilar letter (s) differ significantly as per 0.05 level of probability, T_1 = 5 t ha^{-1} CM, T_2 = 2.5 t ha^{-1} + 50% CFRR, T_3 = 100% CFRR, SP = number of spikelet per panicle, and PFG = percent filled grains.

3.4. Nutrient Content

3.4.1. Nutrient Content (% N) of Grain and Straw

There was a significant effect on N contents in rice grain and straw among the genotype and treatment. Results indicated that the application of T_2 (2.5 t ha^{-1} CM + 50% CFRR) recorded on N content in grain on genotype Pukhi (G1) (1.40%) followed by Utri (G4) (1.39%), Panbira (G2) (1.36%), Kaisa panja (G6) (1.34%), Dumai (G11) (1.32%), Nayan moni (G22) (1.31%), and Vandana (G7) (1.29%), respectively, were significantly higher than the other treatments. In addition, the application of T_1 (5 t ha^{-1} CM) recorded lower N content on genotype BRRI dhan28 (G54) (0.89%), BRRI dhan55 (G60) (0.91%), BRRI dhan42 (G56) (0.92%), B370 (G62) (0.93%), and NMR 151 (G43) (0.94%), respectively, were presented in Table 10. On the other hand, the application of T_2 (2.5 t ha^{-1} CM + 50% CFRR) recorded on N content in straw on genotype Utri (G4) (1.20%) followed by Panbira (G2) (1.19%), Pukhi (G1) (1.18%), Kaisa panja (G6) (1.17%), Dumai (G11) (1.15%), Luanga (G5) (1.14%), and Nayan moni (G22) (1.13%), respectively, were significantly higher than the other treatments, while the application of T_1 (5 t ha^{-1} CM) recorded lower N content on genotype GHUA (G36) (0.81%), BRRI dhan28 (G54) (0.82%), BRRI dhan55 (G60) (0.83%), and B370 (G62) (0.84%), respectively, in Table 10.

3.4.2. Nutrient Content (% P) of Grain and Straw

There was a significant effect on P contents in rice grain and straw among the genotype and treatment. Results indicated that the application of T_2 (2.5 t ha^{-1} CM + 50% CFRR) recorded on P content in grain on genotype BRRI dhan72 (G53) (0.40%) followed by Vandana (G7) (0.38%), Pukhi (G1) (0.37%), Dharial (G3) (0.36%), Kaisa panja (G6) (0.35%), Utri (G4) (0.34%), and Dular (G8) (0.33%), respectively, were significantly higher than the other treatments. In addition, the application of T_1 (5 t ha^{-1} CM) recorded lower P content on genotype BINASAIL (G63) (0.19%), MGAWA (G38) (0.20%), BANGKUL (G42) (0.21%), B370 (G62) (0.22%), BRRI dhan28 (G54) (0.23 %), respectively, were presented in Table 11. On the other hand, the application of T_2 (2.5 t ha^{-1} CM + 50% CFRR) recorded on P content in straw on genotype Dharial (G3) (0.25%) followed by BRRI dhan72 (G53) (0.24%), Pukhi (G1) (0.23%), Kaisa panja (G6) (0.22%), Dharial (G3) (0.21%), Luanga (G5) (0.20%), and Kaisa panja (G6) (0.19%), respectively, were significantly higher than the other treatments, while the application of T_1 (5 t ha^{-1} CM) recorded lower P content on genotype Sonhamoni (G9) (0.10%), BRRI dhan28 (G54) (0.11%), BRRI dhan42 (G56) (0.11%), and B370 (G62) (0.12%), respectively, in Table 11.

3.4.3. Nutrient Content (% K) of Grain and Straw

There was a significant effect on K contents in rice grain and straw among the genotype and treatment. Results indicated that the application of T_2 (2.5 t ha^{-1} CM + 50% CFRR) recorded on K content in grain on genotype Putra 2 (G47) (0.19%) followed by MR297(G45) (0.18%), BRRI dhan39 (G55) (0.17%), BRRI dhan75 (G59) (0.16%), and Pukhi (G1) (0.15%), respectively, were significantly higher than the other treatments, while application of T_1 (5 t ha^{-1} CM) recorded lower P content on genotype BANGKUL (G42) (0.07%), B370 (G62) (0.08%), BRRI dhan55 (G60) (0.09%), BINASAIL (G63) (0.10%), and BRRI dhan39 (G55) (0.11%), respectively, were presented in Table 12. On the other hand, the application of T_2 (2.5 t ha^{-1} CM + 50% CFRR) recorded on K content in straw on genotype Pukhil (G1) (1.84%) followed by Utri (G4) (1.81%), Panbira (G2) (1.79%), Vandana (G7) (1.78%), Parija (G12) (1.77%), Dharial (G3) (1.76%), and Kaisa panja (G6) (1.74%), respectively, were significantly higher than the other treatments, while the application of T_1 (5 t ha^{-1} CM) recorded lower K content on genotype B370 (G62) (1.25%), BINASAIL (G63) (1.27%), BRRI dhan55 (G60) (1.28%), and BRRI dhan28 (G54) (1.29%), respectively, in Table 12.

Table 10. Grain and straw nutrient content (% N) of 64 rice genotypes as influenced by treatment and genotype (pooled over two seasons).

Genotype (G)	Treatment (T)	Grain							Straw							
		% N							% N							
	1	1.12c		1.05c		0.97c		0.96c		1.03b		0.88c		0.85b		0.85c
G1	2	1.40a	G17	1.27a	G33	1.20a	G49	1.22a	G1	1.18a	G17	1.01a	G33	1.02a	G49	0.96a
	3	1.26b		1.16b		1.09b		1.11b		1.06b		0.93b		0.88b		0.90b
LSD(0.05)		0.034		0.028		0.022		0.02		0.035		0.031		0.034		0.031
	1	1.10c		1.04c		1.04c		0.92c		1.02b		0.85c		0.85c		0.83b
G2	2	1.36a	G18	1.23a	G34	1.23a	G50	1.15a	G2	1.19a	G18	1.06a	G34	1.01a	G50	0.92a
	3	1.23b		1.14b		1.12b		1.07b		1.05b		0.92b		0.90b		0.85b
LSD(0.05)		0.038		0.031		0.034		0.025		0.033		0.032		0.028		0.028
	1	1.04c		1.06c		0.99a		0.95c		0.95b		0.85c		0.83c		0.86c
G3	2	1.25a	G19	1.28a	G35	1.21a	G51	1.16a	G3	1.11a	G19	1.09a	G35	0.99a	G51	0.94a
	3	1.13b		1.16b		1.10b		1.07b		0.97b		0.94b		0.88b		0.91b
LSD(0.05)		0.03		0.027		0.032		0.034		0.029		0.025		0.025		0.028
	1	1.11c		1.06c		1.03c		0.93c		0.99c		0.83c		0.81c		0.84c
G4	2	1.39a	G20	1.26a	G36	1.29a	G52	1.19a	G4	1.20a	G20	1.06a	G36	0.98a	G52	0.97a
	3	1.21b		1.14b		1.18b		1.07b		1.03b		0.91b		0.86b		0.93b
LSD(0.05)		0.032		0.025		0.037		0.025		0.031		0.028		0.028		0.026
	1	1.09c		1.07c		1.03c		0.97c		0.95b		0.84c		0.89b		0.86c
G5	2	1.28a	G21	1.24a	G37	1.25a	G53	1.22a	G5	1.14a	G21	1.06a	G37	1.03a	G53	0.99a
	3	1.19b		1.15b		1.14b		1.10b		0.98b		0.97b		0.91b		0.90b
LSD(0.05)		0.027		0.034		0.034		0.023		0.029		0.03		0.034		0.02
	1	1.10c		1.09c		1.06c		0.89c		0.97b		0.95b		0.88b		0.82b
G6	2	1.34a	G22	1.31a	G38	1.22a	G54	1.15a	G6	1.17a	G22	1.13a	G38	1.01a	G54	0.93a
	3	1.22b		1.20b		1.13b		1.06b		0.99b		0.98b		0.90b		0.85b
LSD(0.05)		0.038		0.027		0.025		0.027		0.031		0.041		0.028		0.031
	1	1.10c		1.10c		1.00c		1.02c		0.95b		0.92b		0.83c		0.94c
G7	2	1.29a	G23	1.29a	G39	1.28a	G55	1.26a	G7	1.10a	G23	1.11a	G39	1.03a	G55	1.03a
	3	1.18b		1.18b		1.11b		1.15b		0.97b		0.94b		0.89b		0.96b
LSD(0.05)		0.031		0.026		0.028		0.026		0.026		0.028		0.022		0.023
	1	1.07c		1.04c		1.08c		0.92c		0.92c		0.92b		0.90b		0.85c
G8	2	1.26a	G24	1.23a	G40	1.32a	G56	1.16a	G8	1.09a	G24	1.08a	G40	1.08a	G56	0.92a
	3	1.15b		1.12b		1.19b		1.05b		0.97b		0.96b		0.92b		0.89b
LSD(0.05)		0.029		0.03		0.034		0.03		0.025		0.02		0.03		0.028
	1	1.07c		1.06c		1.05c		0.93c		0.93c		0.89c		0.86c		0.83c
G9	2	1.28a	G25	1.25a	G41	1.24a	G57	1.17a	G9	1.12a	G25	1.02a	G41	1.04b	G57	0.95a
	3	1.19b		1.13b		1.12b		1.08b		1.01b		0.93b		0.94b		0.88b
LSD(0.05)		0.034		0.031		0.033		0.032		0.025		0.028		0.023		0.02
	1	1.13c		1.04c		0.99c		0.96c		1.01b		0.85c		0.82c		0.83c
G10	2	1.39a	G26	1.20a	G42	1.20a	G58	1.19a	G10	1.18a	G26	1.01a	G42	0.98a	G58	0.95a
	3	1.25b		1.11b		1.11b		1.08b		1.03b		0.90b		0.94b		0.91b
LSD(0.05)		0.027		0.025		0.034		0.024		0.03		0.016		0.02		0.027
	1	1.11c		1.02c		0.94c		1.00c		0.95c		0.83c		0.85b		0.91c
G11	2	1.32a	G27	1.24a	G43	1.18a	G59	1.24a	G11	1.15a	G27	1.03a	G43	0.97a	G59	1.02a
	3	1.21b		1.10b		1.07b		1.13b		0.99b		0.91b		0.86b		0.96b
LSD(0.05)		0.029		0.028		0.028		0.034		0.027		0.025		0.023		0.022
	1	1.06c		1.03c		0.96c		0.91c		0.92b		0.91b		0.84c		0.83c
G12	2	1.25a	G28	1.27a	G44	1.17a	G60	1.17b	G12	01.10a	G28	1.06a	G44	0.96a	G60	0.95a
	3	1.13b		1.13b		1.06b		1.06b		0.95b		0.92b		0.87b		0.90b
LSD(0.05)		0.03		0.034		0.025		0.031		0.025		0.027		0.024		0.025
	1	1.10c		1.05c		0.96c		0.93c		0.94b		0.89c		0.86b		0.85c
G13	2	1.36a	G29	1.29a	G45	1.21a	G61	1.17a	G13	1.14a	G29	1.09a	G45	0.98a	G61	0.97a
	3	1.21b		1.16b		1.09b		1.10b		0.97b		0.94b		0.89b		0.90b
LSD(0.05)		0.031		0.03		0.025		0.031		0.035		0.022		0.023		0.025
	1	1.07c		1.03c		0.94c		0.93c		0.90c		0.88c		0.85c		0.84c
G14	2	1.28a	G30	1.26a	G46	1.20a	G62	1.14a	G14	1.09a	G30	1.11a	G46	0.97a	G62	0.98a
	3	1.15b		1.17b		1.08b		1.05b		0.96b		0.92b		0.89b		0.91b
LSD(0.05)		0.023		0.024		0.029		0.021		0.025		0.02		0.028		0.018
	1	1.05c		1.04c		0.97c		0.96c		0.88c		0.86c		0.87c		0.86c
G15	2	1.25a	G31	1.23a	G47	1.19a	G63	1.16a	G15	1.07a	G31	1.04a	G47	0.93a	G63	0.95a
	3	1.13b		1.12b		1.08b		1.09b		0.93b		0.91b		0.91b		0.89b
LSD(0.05)		0.034		0.03		0.031		0.031		0.028		0.027		0.023		0.028
	1	1.09c		1.01c		0.99c		1.04c		0.92b		0.85c		0.89b		0.92c
G16	2	1.32a	G32	1.21a	G48	1.23a	G64	1.22a	G16	1.12a	G32	1.01a	G48	1.02a	G64	1.02a
	3	1.20b		1.09b		1.10b		1.13b		0.95b		0.89b		0.92b		0.95b
LSD(0.05)		0.023		0.025		0.034		0.037		0.022		0.02		0.035		0.027

In each column, means with similar letter (s) are statistically identical, and those with dissimilar letter (s) differ significantly as per 0.05 level of probability, T1 = 5 t ha^{-1} CM, T2 = 2.5 t ha^{-1} + 50% CFRR, T3 = 100% CFRR, and % N = percentage of nitrogen content.

Table 11. Grain and straw nutrient content (% P) of 64 rice genotypes as influenced by treatment and genotype (pooled over two seasons).

Genotype (G)	Treatment (T)	Grain								Straw							
		% P								% P							
	1	0.25c		0.23c		0.21c		0.26b		0.12b		0.10c		0.13c		0.17b
G1	2	0.37a	G17	0.31a	G33	0.33a	G49	0.33a	G1	0.23a	G17	0.20a	G33	0.22a	G49	0.21a
	3	0.31b		0.27b		0.27b		0.31a		0.20a		0.16b		0.16b		0.19ab
LSD(0.05)		0.03		0.03		0.025		0.024		0.03		0.028		0.023		0.027
	1	0.22c		0.22b		0.22c		0.26b		0.11b		0.13c		0.13b		0.16b
G2	2	0.31a	G18	0.27a	G34	0.28a	G50	0.33a	G2	0.19a	G18	0.21a	G34	0.19a	G50	0.23a
	3	0.27b		0.25a		0.25b		0.3a		0.17a		0.17b		0.15b		0.20a
LSD(0.05)		0.028		0.023		0.025		0.026		0.028		0.025		0.028		0.027
	1	0.26c		0.21c		0.21b		0.27c		0.15c		0.11b		0.12c		0.17b
G3	2	0.36a	G19	0.30a	G35	0.27a	G51	0.36a	G3	0.25a	G19	0.19a	G35	0.18a	G51	0.24a
	3	0.30b		0.26b		0.23b		0.31b		0.21b		0.17a		0.15b		0.19b
LSD(0.05)		0.027		0.024		0.024		0.03		0.034		0.027		0.025		0.029
	1	0.23c		0.22c		0.21b		0.23c		0.11c		0.12b		0.12b		0.14c
G4	2	0.34a	G20	0.34a	G36	0.25a	G52	0.33a	G4	0.21a	G20	0.22a	G36	0.17a	G52	0.22a
	3	0.28b		0.29b		0.24ab		0.27b		0.17b		0.20a		0.15a		0.17b
LSD(0.05)		0.028		0.026		0.023		0.028		0.028		0.025		0.023		0.024
	1	0.22c		0.25c		0.23b		0.27c		0.11c		0.14c		0.13b		0.16b
G5	2	0.31a	G21	0.35a	G37	0.29a	G53	0.40a	G5	0.20a	G21	0.23a	G37	0.18a	G53	0.24a
	3	0.28b		0.31b		0.26a		0.33b		0.16b		0.19b		0.15a		0.19b
LSD(0.05)		0.025		0.027		0.027		0.031		0.029		0.027		0.029		0.04
	1	0.26c		0.24b		0.20c		0.23c		0.14b		0.13c		0.11b		0.15b
G6	2	0.35a	G22	0.29a	G38	0.25a	G54	0.34a	G6	0.22a	G22	0.19a	G38	0.17a	G54	0.21a
	3	0.31b		0.27a		0.23b		0.27b		0.19a		0.16b		0.16a		0.17b
LSD(0.05)		0.031		0.025		0.02		0.028		0.034		0.022		0.016		0.020
	1	0.26c		0.23b		0.25c		0.22c		0.13c		0.12b		0.13b		0.14b
G7	2	0.38a	G23	0.27a	G39	0.33a	G55	0.30a	G7	0.25a	G23	0.18a	G39	0.21a	G55	0.19a
	3	0.32b		0.25a		0.29b		0.26b		0.21b		0.14b		0.19a		0.16b
LSD(0.05)		0.023		0.024		0.028		0.03		0.031		0.025		0.038		0.025
	1	0.24c		0.22b		0.24b		0.22c		0.11b		0.11c		0.13b		0.11c
G8	2	0.33a	G24	0.26a	G40	0.29a	G56	0.29a	G8	0.21a	G24	0.19a	G40	0.18a	G56	0.18a
	3	0.29b		0.24ab		0.26ab		0.25b		0.19a		0.14b		0.16a		0.14b
LSD(0.05)		0.025		0.027		0.027		0.023		0.03		0.017		0.024		0.023
	1	0.22c		0.26c		0.21c		0.24c		0.10b		0.15b		0.12b		0.14b
G9	2	0.29a	G25	0.32a	G41	0.28a	G57	0.32a	G9	0.17a	G25	0.19a	G41	0.17a	G57	0.20a
	3	0.26b		0.29b		0.24b		0.27b		0.15a		0.17ab		0.14b		0.16b
LSD(0.05)		0.025		0.027		0.023		0.025		0.022		0.031		0.022		0.029
	1	0.22c		0.21c		0.21b		0.26c		0.12c		0.13c		0.12c		0.15b
G10	2	0.31a	G26	0.29a	G42	0.27a	G58	0.35a	G10	0.19a	G26	0.19a	G42	0.19a	G58	0.21a
	3	0.27b		0.26b		0.25a		0.31b		0.16b		0.16b		0.15b		0.19a
LSD(0.05)		0.031		0.016		0.022		0.03		0.028		0.023		0.022		0.034
	1	0.23b		0.22b		0.26c		0.25c		0.12b		0.11c		0.16b		0.15b
G11	2	0.29a	G27	0.27a	G43	0.34a	G59	0.37a	G11	0.18a	G27	0.19a	G43	0.22a	G59	0.24a
	3	0.27a		0.26a		0.31b		0.30b		0.16a		0.16b		0.19a		0.18b
LSD(0.05)		0.025		0.023		0.031		0.028		0.029		0.025		0.029		0.033
	1	0.24c		0.24b		0.24c		0.22c		0.11c		0.14b		0.14c		0.12c
G12	2	0.32a	G28	0.33a	G44	0.35a	G60	0.31a	G12	0.20a	G28	0.21a	G44	0.22a	G60	0.20a
	3	0.28b		0.30a		0.30b		0.26b		0.16b		0.17b		0.18b		0.17b
LSD(0.05)		0.028		0.031		0.028		0.025		0.032		0.03		0.031		0.025
	1	0.23c		0.25c		0.22c		0.22c		0.13c		0.15c		0.13b		0.12b
G13	2	0.31a	G29	0.36a	G45	0.33a	G61	0.28a	G13	0.19a	G29	0.24a	G45	0.19a	G61	0.18a
	3	0.28b		0.31b		0.27b		0.25b		0.15b		0.19b		0.17a		0.16a
LSD(0.05)		0.023		0.028		0.028		0.018		0.028		0.027		0.027		0.031
	1	0.21c		0.27b		0.21c		0.22b		0.2c		0.16b		0.12b		0.12b
G14	2	0.28a	G30	0.36a	G46	0.31a	G62	0.26a	G14	0.18a	G30	0.23a	G46	0.18a	G62	0.17a
	3	0.23b		0.30ab		0.26b		0.23b		0.15b		0.18b		0.16a		0.14b
LSD(0.05)		0.022		0.029		0.029		0.027		0.024		0.03		0.028		0.023
	1	0.23c		0.21c		0.25c		0.19c		0.11b		0.12b		0.17b		0.11c
G15	2	0.30a	G31	0.26a	G47	0.32a	G63	0.27a	G15	0.18a	G31	0.17a	G47	0.21a	G63	0.18a
	3	0.27b		0.24b		0.29b		0.24b		0.16a		0.15a		0.18ab		0.14b
LSD(0.05)		0.016		0.023		0.023		0.024		0.024		0.026		0.029		0.016
	1	0.22b		0.23c		0.24c		0.24b		0.12b		0.13b		0.16b		0.13b
G16	2	0.27a	G32	0.31a	G48	0.32a	G64	0.30a	G16	0.19a	G32	0.20a	G48	0.20a	G64	0.19a
	3	0.24ab		0.26b		0.28b		0.26b		0.14b		0.16b		0.18ab		0.14b
LSD(0.05)		0.028		0.024		0.025		0.027		0.023		0.024		0.025		0.025

In each column, means with similar letter (s) are statistically identical, and those with dissimilar letter (s) differ significantly as per 0.05 level of probability, T_1 = 5 t ha^{-1} CM, T_2 = 2.5 t ha^{-1} + 50% CFRR, T_3 = 100% CFRR, and % P = percentage of phosphorus content.

Table 12. Grain and straw nutrient content (% K) of 64 rice genotypes as influenced by treatment and genotype (pooled over two seasons).

Genotype (G)	Treatment (T)	Grain								Straw						
		% K								% K						
	1	0.11b		0.09b		0.09b		0.10b		1.51c		1.41c		1.39c		1.32c
G1	2	0.17a	G17	0.16a	G33	0.14a	G49	0.16a	G1	1.84a	G17	1.76a	G33	1.62a	G49	1.54a
	3	0.15a		0.15a		0.13a		0.13b		1.70b		1.54b		1.49b		1.40b
LSD(0.05)		0.020		0.025		0.023		0.030		0.044		0.035		0.034		0.033
	1	0.10c		0.09c		0.08b		0.11c		1.47c		1.40c		1.37c		1.30c
G2	2	0.16a	G18	0.16a	G34	0.16a	G50	0.19a	G2	1.79a	G18	1.74a	G34	1.71a	G50	1.59a
	3	0.13b		0.13b		0.14a		0.16b		1.68b		1.53b		1.54b		1.42b
LSD(0.05)		0.020		0.026		0.023		0.028		0.032		0.037		0.031		0.030
	1	0.12b		0.08c		0.09c		0.09b		1.45c		1.37c		1.34c		1.31c
G3	2	0.16a	G19	0.15a	G35	0.16a	G51	0.16a	G3	1.76a	G19	1.78a	G35	1.72a	G51	1.57a
	3	0.14a		0.11b		0.13b		0.15a		1.63b		1.56b		1.53b		1.43b
LSD(0.05)		0.023		0.022		0.011		0.020		0.040		0.034		0.027		0.034
	1	0.12b		0.09c		0.10c		0.11b		1.46c		1.34c		1.38c		1.28c
G4	2	0.15a	G20	0.17a	G36	0.16a	G52	0.18a	G4	1.81a	G20	1.70a	G36	1.69a	G52	1.46a
	3	0.14ab		0.14b		0.14b		0.15a		1.70b		1.47b		1.50b		1.40b
LSD(0.05)		0.025		0.020		0.023		0.031		0.041		0.028		0.038		0.033
	1	0.10b		0.09c		0.11c		0.10c		1.38c		1.38c		1.35c		1.31c
G5	2	0.15a	G21	0.14a	G37	0.17a	G53	0.19a	G5	1.70a	G21	1.72a	G37	1.65a	G53	1.60a
	3	0.13b		0.11b		0.15b		0.16b		1.59b		1.54b		1.51b		1.42b
LSD(0.05)		0.027		0.021		0.022		0.025		0.032		0.033		0.026		0.035
	1	0.09c		0.10c		0.09b		0.12b		1.40c		1.37c		1.33c		1.29c
G6	2	0.15a	G22	0.16a	G38	0.14a	G54	0.18a	G6	1.74a	G22	1.74a	G38	1.67a	G54	1.55a
	3	0.12b		0.13b		0.12a		0.14b		1.62b		1.53b		1.49b		1.37b
LSD(0.05)		0.025		0.028		0.025		0.03		0.032		0.030		0.041		0.037
	1	0.09c		0.10b		0.11b		0.11a		1.42c		1.35c		1.39c		1.28c
G7	2	0.13a	G23	0.14a	G39	0.15a	G55	0.17a	G7	1.78a	G23	1.70a	G39	1.72a	G55	1.50a
	3	0.11b		0.12ab		0.14a		0.13b		1.63b		1.52b		1.51b		1.36b
LSD(0.05)		0.021		0.025		0.025		0.021		0.034		0.025		0.031		0.028
	1	0.11c		0.11b		0.12b		0.13b		1.36c		1.37b		1.36c		1.27c
G8	2	0.17a	G24	0.17a	G40	0.16a	G56	0.18a	G8	1.66a	G24	1.61a	G40	1.64a	G56	1.44a
	3	0.14b		0.15a		0.15a		0.15ab		1.52b		1.48b		1.47b		1.34b
LSD(0.05)		0.023		0.023		0.020		0.027		0.041		0.022		0.034		0.031
	1	0.08b		0.10b		0.09b		0.10b		1.44c		1.41c		1.37c		1.25c
G9	2	0.16a	G25	0.15a	G41	0.13a	G57	0.17a	G9	1.71a	G25	1.72a	G41	1.69a	G57	1.46a
	3	0.14a		0.14a		0.12a		0.15a		1.59b		1.50b		1.48b		1.34b
LSD(0.05)		0.025		0.022		0.021		0.023		0.034		0.034		0.029		0.035
	1	0.08c		0.08b		0.07b		0.12b		1.40c		1.34c		1.34c		1.27c
G10	2	0.15a	G26	0.13a	G42	0.12a	G58	0.17a	G10	1.79a	G26	1.65a	G42	1.71a	G58	1.50a
	3	0.12b		0.12ab		0.11a		0.14b		1.66b		1.44b		1.45b		1.35b
LSD(0.05)		0.017		0.021		0.020		0.028		0.042		0.025		0.030		0.034
	1	0.10b		0.09c		0.11b		0.11c		1.43c		1.34c		1.34c		1.27c
G11	2	0.14a	G27	0.15a	G43	0.15a	G59	0.19a	G11	1.78a	G27	1.62a	G43	1.55a	G59	1.56a
	3	0.11b		0.12b		0.15a		0.16b		1.63b		1.41b		1.46b		1.38b
LSD(0.05)		0.020		0.016		0.025		0.024		0.027		0.036		0.038		0.035
	1	0.11b		0.09c		0.11c		0.09c		1.40c		1.37c		1.36c		1.28c
G12	2	0.16a	G28	0.16a	G44	0.16a	G60	0.16a	G12	1.77a	G28	1.70a	G44	1.53a	G60	1.47a
	3	0.13b		0.14b		0.14b		0.12b		1.61b		1.49b		1.44b		1.34b
LSD(0.05)		0.020		0.021		0.022		0.020		0.030		0.037		0.035		0.035
	1	0.09c		0.08c		0.12c		0.11b		1.36c		1.39c		1.32c		1.28c
G13	2	0.15a	G29	0.15a	G45	0.18a	G61	0.16a	G13	1.72a	G29	1.68a	G45	1.56a	G61	1.51a
	3	0.12b		0.12b		0.15b		0.13ab		1.55b		1.50b		1.45b		1.35b
LSD(0.05)		0.016		0.023		0.023		0.027		0.034		0.036		0.034		0.031
	1	0.09b		0.08b		0.08b		0.08b		1.37c		1.34c		1.33c		1.25c
G14	2	0.18a	G30	0.13a	G46	0.16a	G62	0.14a	G14	1.69a	G30	1.52a	G46	1.60a	G62	1.46a
	3	0.17a		0.12ab		0.14a		0.11b		1.51b		1.45b		1.47b		1.33b
LSD(0.05)		0.024		0.020		0.024		0.025		0.033		0.029		0.028		0.037
	1	0.08b		0.11b		0.11c		0.10c		1.34c		1.35c		1.34c		1.27c
G15	2	0.14a	G31	0.16a	G47	0.19a	G63	0.14a	G15	1.65a	G31	1.54a	G47	1.59a	G63	1.43a
	3	0.13a		0.14a		0.15b		0.12b		1.49b		1.44b		1.42b		1.35b
LSD(0.05)		0.016		0.028		0.023		0.016		0.035		0.031		0.031		0.030
	1	0.10b		0.09c		0.12b		0.10b		1.43c		1.35c		1.35c		1.29c
G16	2	0.15a	G32	0.15a	G48	0.18a	G64	0.15a	G16	1.79a	G32	1.66a	G48	1.55a	G64	1.52a
	3	0.14a		0.11b		0.14b		0.13a		1.62b		1.54b		1.39b		1.40b
LSD(0.05)		0.023		0.022		0.028		0.025		0.034		0.027		0.035		0.031

In each column, means with similar letter (s) are statistically identical, and those with dissimilar letter (s) differ significantly as per 0.05 level of probability, T1 = 5 t ha^{-1} CM, T2 = 2.5 t ha^{-1} + 50% CFRR, T3 = 100% CFRR, and % k = percentage of potassium content.

4. Discussion

The results of this experiment revealed that there is a high correlation between plant height and rice plant productivity or growth rate. During the developing stages of rice plants, they grow and flourish to a specific height [24]. Phenotype refers to the process of measuring the basic and complicated traits of a rice species, which include plant height. Organic fertilizer has a positive impact on the growth and production of various crops [25,26]. Plant height is also a major agronomic characteristic that indirectly affects rice plant yields. Traditionally, rice genotypes are tall in stature, are susceptible to loading at maturity, respond poorly to nitrogen fertilizer, and, therefore, produce low yields. For high-yielding varieties, moderate plant heights are desirable. Approximately half of the recommended chemical fertilizer is saved, according to the findings of this study. It differs from the findings of Chandini et al. [13], who discovered that organic fertilizers could potentially replace 50% of needed nitrogen and phosphorus fertilizers by improving. They examined the efficacy of suggested nitrogen and phosphorus fertilizers and lowering chemical fertilizer costs while also preventing environmental contamination from widespread use. Chemical N and P application can be reduced by 50%, while rice yield is boosted with the addition of 5 t ha^{-1} organic fertilizer [27]. However, when organic fertilizers were used in conjunction with a half dose of inorganic fertilizer on lettuce (*Lactuca sativa*), twenty-five percent (25%) more growth was achieved than when only chemical fertilizer was used, and at least fifty percent (50%) of chemical fertilizer was saved by using organic fertilizer [28]. The enhanced vegetative growth and additional nitrogen contribution that occurs in response to the recommended fertilizer dose could be the primary reason for the increase in plant height [29]. The availability of main nutrients was equated to the variance in plant height caused by nutrient sources. Chemical fertilizers provide nutrients that are easily soluble in soil solutions and hence available to plants almost immediately. Microbial action and increased soil physical condition contribute to nutrient availability from organic sources. Bargaz et al. [30] agreed with these conclusions. Variations in the availability of key nutrients were thought to be the cause of plant height variation caused by nutrition source. Setiawati et al. [31] reported similar results in rice crops.

Tillering is a crucial feature for grain production and, as a result, a significant factor in rice output. Siavoshi et al. [32] found that different fertilizer mixes increased the number of tillers in rice plants. According to them, the increased number of tillers per square meter could be related to increased nitrogen availability, which is important for cell division. Organic sources provide plants with a better balanced diet, particularly micronutrients, which have a good impact on the number of tillers in plants [33]. The number of productive tillers (tillers that carry panicles) is more important than the overall number of tillers in determining rice plant productivity. The considerable difference in the number of tiller and panicle plant^{-1} seen in this study can be attributed to genetic differences in their ability to use fertilizers, partition photosynthesis, and accumulate dry matter. The number of panicles grew with increasing nitrogen rates [34,35], and the number of panicles plant^{-1} increased with increasing NPK rates. Organic manure and chemical fertilizers produced the most prolific tillers, which could be attributed to the nutrient availability in the soil. The availability of nutrients from organic sources, on the other hand, is attributed to microbial action and improved soil physical conditions. The excessive application of inorganic fertilizers is not required to generate good tillers if organic manures are supplemented, which also helps to provide vital micronutrients to the plants [36,37]. In rice crops, Mirza et al. [38] found similar findings.

Rice genotypes differed considerably in panicle length and grain yield. These findings are thought to be attributable to the rice plant receiving extra nutrients as a result of the soil amendment. The application of organic manure and chemical fertilizers resulted in a considerable increase in panicle length [1]. Similar findings were reported by [39,40].

In comparison to fertilizers, manure had a stronger effect in increasing the quantity of grains panicle^{-1}. It is possible that this owes to the manure's higher nutrient availability. The application of organic materials as fertilizers provided growth-regulating substances that helped better grain filling and improved the physical, chemical, and microbial properties of the soil in this study, and the organic manure and chemical fertilizer had a significant effect because the application of organic materials as fertilizers provides growth-regulating substances that helped better grain filling and improved the physical, chemical, and microbial properties of the soil [41]. The use of organic manures and chemical fertilizers resulted in a considerable increase in grains per panicle [12]. These findings are also supported by Iqbal et al. [42].

The combined application of organic manure and artificial fertilizer resulted in statistically significant change in the weight of 1000 seeds. The combined use of organic manure and artificial fertilizers enhanced the 1000-grain weight of rice [43]. The use of organic manure and artificial fertilizer enhanced the 1000-grain weight of rice [44]. Hoque et al. [45] also found that combining organic manure with chemical fertilizers improved grain weight by 1000 grains. Geng et al. [46] reported that the availability of nutrients throughout the reproductive stage resulted in improved grain filling and thus increased grain weight.

The addition of organic manure to chemical fertilizers enhanced grain output significantly in all genotypes. This was due to the effect of organic and chemical fertilizers on encouraging growth and, as a result, increasing yields. The various fertilizers aided tiller growth and helped spikelet formation, resulting in a higher yield. Wang et al. [34] supported these findings. The fact that it improves soil quality, soil health, and crop output could explain this. The observations of [10] backed up this theory. It was demonstrated that applying organic manure can boost photosynthetic efficiency and nutrient availability [9]. Ye et al. [47] suggested the use of organic manure and chemical fertilizers enhanced grain output considerably. Organic manure and chemical fertilizers boosted rice straw yields [48]. These assumptions are supported by [40,49]. Increasing cropping intensity, the use of modern varieties (high-yielding varieties and hybrids), cultivation of high-biomass-potential crops, nutrient leaching, and unbalanced fertilizer application, with no or little addition of organic manure, have resulted in nutrient mining from the soils. To stop nutrient mining, it is not justified to increase the use of only inorganic fertilizers, but the use of organic sources of plant nutrients viz. cow dung, chicken manure, compost, and green manure should be also considered. In this study, nutrient contents of grain and straw of all genotypes showed that the highest N, P, and K contents were recorded in T_2 (2.5 t ha^{-1} CM+ 50% CFRR). These findings are partially similar to these of [50,51], who obtained higher contents of nutrient elements such as N, P, and K in rice by applying chicken manure with inorganic fertilizers. The use of a combination of organic manures and inorganic fertilizers clearly aided plant vegetative growth, resulting in higher straw yield.

5. Conclusions

From the above results, it may be concluded that organic fertilizers in the form of chicken manure have the potential to increase the growth parameters, yield components, and nutritional quality of rice. The use of chicken manure as an organic fertilizer for rice also had positive effects on growth, yield, and nutrient content in the crop. All of the treatments had a significant impact on rice genotypes growth and production. In the current study, it was discovered that 2.5 tons of chicken manure per hectare, combined with 50% of the prescribed chemical fertilizer, resulted in a higher grain yield than the other treatments. From a financial standpoint, producers can employ a combination of organic fertilizer and a lower amount of inorganic fertilizer to increase rice yields while also maintaining and improving soil health.

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