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Genetic variability studies for grain yield, its components traits and quality traits in ratoon rice (*Oryza sativa* L.)

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ABSTRACT

The present study was to investigate the presence of variability among the 20 rice varieties in the ratton crop for 27 characters, which were raised in randomized complete block design (RCBD), with three replications; each entry was planted in 3 rows of 3 meters length at 20 cm × 15 cm spacing in *Rabi* season. The analysis of variance of 20 parents showed significant differences for all 27 traits in study (*viz.,* 10 yield associated traits, 3 traits contributing for ratoonability, 6 physical grain quality traits and 8 cooking quality traits). The phenotypic coefficient of variation (PCV) values are higher than the genotypic coefficient of variation (GCV) values and the difference between them is indicating the little role of environment in the expression of these traits. A wide range of PCV (2.21 – 45.27%) and GCV (1.47– 44.53%) was resulted for 27 traits. Higher GCV and PCV values were observed in grain yield per plant followed by number of ear bearing tillers per plant, alkali spreading value and number of ratoon productive tillers as percentage of main crop productive tillers which signifies the additive genetic control in inheritance of these trait. High heritability coupled with high genetic advance as per cent of means were observed for the characters *viz.,* total number of tillers per plant, number of ear bearing tillers per plant, number of ratoon productive tillers as percentage of main crop productive tillers, number of grains per panicle, kernel breadth after cooking, water uptake, gel consistency, alkali spreading value, amylose content and grain yield per plant indicated the role of additive gene action in governing the inheritance of these traits and improvement of yield related and quality traits through simple selection may be rewarded.

Keywords: *Cooking traits, Genetic advance, Heritability, Quality Traits, Rice, Variability and Variance*

Rice (*Oryza sativa* L., 2n=24) is the most important staple food crop in Asia, which not only contributes more than 21% of the calorific needs of the population of the world but also about 76% of the calorific needs of the South East Asia (Wenge *et al.,* 2003). World wide the area under cultivation is about 167.2 million hectares with production of 769.6 million tonnes with a productivity of 4,600 kg ha^{-1}. Despite these achievements, we still need to produce an additional 1.5-2 million tonnes of milled rice every year with decreasing area under rice to meet the target of 180 million tonnes by 2050. Asia consumes about 90% of the world's rice production. In India rice area under cultivation is about 47.83 million ha with production of 150.04 million tonnes and productivity of 2,838 kg ha^{-1} *(India stat*, 2022-23). Due to various socio-economic constraints, a chance of bringing more area under rice cultivation is very remote. In view of the current situation of food insecurity, a number of limiting factors such as population growth in most of the Asian countries except China continues to be around 2% per year, agricultural land and water resources, ever increasing biotic and abiotic stress and low economic activity in agricultural sector have led to decrease in crop productivity.

Hence, to achieve the target of increased rice production per unit area by developing high yielding varieties to climate resilience by crop improvement programme, plant breeders has to utilized the beneficial genes collection from gene pool that have been accumulated throughout timeline in the rice germplasm. In order to support future breeding programs for yield enhancement through expanding the genetic base and genetic recombination, the knowledge of genetic variation in yield contributing character is essential. However, the success of any breeding programme depends upon the magnitude of genetic variability present in the population. The magnitude of total variability in the population was determined by genetic variability studies which includes genotypic coefficient of variation (GCV), phenotypic coefficient of variation (PCV), heritability, genetic advance and genetic advance as per cent mean (GAM). Variation so observed is the sum estimate of genetic and environmental factors, of which variation caused by the effect of genetic variability alone is heritable. Wider range of genetic variability helps in selecting desired genotypes. In addition to the genetic variability, knowledge on heritability and genetic advance helps the breeder to employ the suitable breeding strategy. Therefore, it is necessary to have knowledge of genetic variability, heritability and genetic advance that is present in the available genetic material.

MATERIAL AND METHODS

The experimental material for the present investigation consisted of 20 varieties of ratoon rice at Acharya N.G. Ranga Agricultural University, Regional Agricultural Research Station (RARS), Maruteru, Andhra Pradesh. The 20 ratooned parents (*viz.,* MTU 1121, MTU 1001, MTU 1075, MTU 3626, MTU 7029, MTU 1061, MTU 1064, MTU-2077 , MTU 2716, MTU-1140, MTU 1112, MTU 4870, BPT 3291, BPT 5204, PLA 1100, MTU-1166, MTU 1078, MTU 2067, MCM 100 and MTU 1071) were harvested at the time of maturity. The main crop was harvested at the time of physiological maturity, leaving a stubble height of 30 cm above the ground level. Stubble's left over were then allowed to regenerate. Fertilizer schedule of 60:40:30 kg NPK ha^{-1} was adopted for main crop. Fertilizer application which is one fourth of the main crop recommendations were applied to the ratoon crop two days after the harvest of the main crop (Ambili and Rosamma, 2002), ten randomly selected plants of each parent and hybrid from each replication were used to estimate the regenerated tillers and ratoon yield.

Observations were recorded on ten randomly selected plants in each replication for 27 characters, consisting of 10 yield attributing characters viz., days to 50% flowering, days to maturity, plant height (cm), total number of tillers per plant, number of ear bearing tillers per plant, panicle length per plant (cm), number of grains per panicle, test weight (gm), leaf area index at maximum tillering stage, grain yield per plant; However, in ratoon crop, additionally another 3 traits contributing for ratoonability, were recorded *viz.,* number of ratoon tillers as percentage of main crop tiller, number of vegetative buds after the harvest of main crop, number of ratoon ear bearing tillers as percentage of main crop ear bearing tillers, 6 physio-chemical traits such as hulling per cent, milling per cent, head rice recovery per cent, kernel length (mm), kernel breadth (mm), L/B ratio; and 8 cooking quality traits such as kernel length after cooking (mm), kernel breadth after cooking (mm), kernel elongation ratio, volume expansion ratio, water uptake value (ml), gel consistency, alkali digestion value (mm) and amylose content. The success of any crop improvement programme rely upon the genetic variability available in the population. Selection of genotype or parents may not be desirable until unless the population consists of wider range of genetic variability. The knowledge only on estimates of heritability is not sufficient for an effective selection, along with heritability and genetic advance if studied might be more useful for the breeder to employ the suitable breeding strategy. Hence keeping in view of these parameter the present investigation was done on genetic variability, heritability and genetic advance present in the available genetic material.

Genetic variability together with the heritability estimates would give a better idea on the amount of genetic gain expected out of selection (Burton, 1952 and 1953). Further, the magnitude of heritable variability is the most important aspect, which has close relationship with response to selection. Heritability estimates along with genetic advance are more helpful in predicting the gain under selection than heritability estimates alone. However, it is not necessary that a character showing high heritability will always exhibit high genetic advance (Johanson *et al*., 1955).

In the present investigation, the analysis of variance revealed significant differences among the genotypes for all the characters indicating a high degree of variability in the material (Table 1). The PCV values are slightly higher than the GCV values and the difference between them is indicating the little role of environment in the expression of these traits. The

Table 1. Analysis of variance for grain yield, yield component, physio-chemical and cooking quality trait of ratoon of 20 varieties in rice (*Oryza sativa* L.)

S.No	Source of variations	Replications (d.f=2)	Treatments (df=19)	Error (df=38)	Total (df=59)
1	Days to 50% flowering	0.517	37.389**	1.061	38.967
2	Days to maturity	0.067	101.245**	7.505	108.817
3	Plant height (cm)	0.584	205.102**	10.196	215.882
4	Total number of tillers per plant	0.267	8.676**	1.442	10.385
5	Number of ratoon tillers as percentage of main crop tillers	12.802	417.627**	118.07	548.499
6	Number of vegetative buds after the harvest of main crop	0.95	7.526**	2.003	10.479
7	Number of ear bearing tillers per plant	0.163	9.955**	0.559	10.677
8	Number of ratoon productive tillers as percentage of main crop productive tillers	4.745	728.184**	107.54	840.473
9	Panicle length (cm)	0.031	8.359**	0.461	8.851
10	Number of grains per panicle	16.888	1709.850**	81.565	1808.3
11	Test weight (g)	0.123	13.466**	0.236	13.825
12	LAI at max tillering stage	0.029	0.354**	0.069	0.453
13	Grain yield per plant (g)	0.518	128.831**	1.421	130.769
14	Hulling (%)	0.65	5.668**	1.699	8.018
15	Milling (%)	0.104	26.787**	1.207	28.098
16	Head rice recovery (%)	0.114	39.769**	1.664	41.548
17	Kernel length (mm)	0.011	0.257**	0.03	0.299
18	Kernel breadth (mm)	0.002	0.075**	0.003	0.08
19	Length/Breadth Ratio	0.012	0.095**	0.017	0.124
20	Kernel length after cooking (mm)	0.002	1.499**	0.016	1.517
21	Kernel breadth after cooking (mm)	0	0.213**	0.003	0.216
22	Kernel Elongation Ratio	0.001	0.040**	0.004	0.044
23	Volume expansion ratio	0.053	0.205**	0.099	0.357
24	Water uptake (ml)	6.679	2993.241**	43.653	3043.57
25	Gel consistency (mm)	0.114	148.584**	2.116	150.813
26	Alkali spreading value (mm)	0.002	6.322**	0.022	6.345
27	Amylose content (%)	0.014	7.524**	1.047	8.586

**** Significant at 1% level**

results of heritability, genetic advance and genetic advance as per cent of mean are detailed in the Table 2 and Figures 1 and 2.

RESULTS AND DISCUSSION

The superior achievement of rice breeding programme hinges on the selection of parents based on mean performance, a wide range of variation in 20 ratooned rice varieties mean performance was observed for all the 27 traits in present study *i.e.*, number of days to 50% flowering (43.67 to 56.00 days), days to maturity varied (68.00 to 91.00 days), plant height (90.36 to 116.06 cm), total number of tillers per plant (4.33 to 11.67), number of ratoon tillers as percentage of main crop tillers (43.00 to 100.00), number of vegetative buds after the harvest of main crop (6.67 to 13.00), number of ear bearing tillers per plant (2.33 to 8.67), number of ratoon productive tillers ass percentage of main crop productive tillers (31.22 to 79.17), panicle length per plant (18.37 to 21.64 cm), number of number of grains per panicle (99.18 to 186.60), test weight (14.96 to 22.62 g), leaf area index at maximum tillering stage (1.69 to 3.03), grain yield per plant (5.68 to 26.07 g), hulling per cent (75.18% to 80.48%), milling per centage (62.80% to 78.80%), head rice recovery ranged (57.84% to 70.82%), kernel length (4.82 to 5.83 mm), kernel breadth (1.73

Table 2. Estimates of variability, heritability and genetic advance as per cent of mean for grain yield, yield components and quality traits in 20 varieties of rice (*Oryza sativa* L.)

S. No.	Character	Mean	Range		Coefficient of variation (%)		Heritability in broad sense (h^2_b)	Genetic advance (GA) (%)	Genetic advance as per cent of mean (GAM)
			Min	Max	PCV	GCV			
1	Days to 50% flowering	49.73	43.7	56	7.3	7	91.9	6.87	13.82
2	Days to maturity	79.52	68	91	7.83	7.03	80.6	10.34	13
3	Plant height (cm)	105.37	90.4	116	8.23	7.65	86.4	15.44	14.65
4	Total number of tillers per plant	8.72	4.33	11.7	22.5	17.82	62.6	2.53	29.03
5	Number of ratoon tillers as percentage of main crop tillers	73.67	43	100	20	13.56	45.8	13.93	18.91
6	Number of vegetative buds after the harvest of main crop	10.5	6.67	13	18.7	12.92	47.9	1.94	18.43
7	Number of ear bearing tillers per plant	5.19	2.33	8.67	37	34.08	84.9	3.36	64.66
8	Number of ratoon productive tillers as percentage of main crop productive tillers	64.38	31.2	79.2	27.5	22.34	65.8	24.03	37.33
9	Panicle length (cm)	22.43	18.4	21.6	7.84	7.23	85.1	3.08	13.75
10	Number of grains per panicle	148.81	99.2	187	16.8	15.66	86.9	44.75	30.07
11	Test weight (g)	18.32	15	22.6	11.8	11.46	94.9	4.21	23.01
12	LAI at max tillering stage	2.13	1.69	3.03	19	14.48	58	0.48	22.7
13	Grain yield per plant (g)	14.63	5.68	26.1	45.3	44.53	96.8	13.21	90.24
14	Hulling (%)	78.52	75.2	80.5	2.21	1.47	43.8	1.57	2
15	Milling (%)	71.23	62.8	74.8	4.38	4.1	87.6	5.63	7.9
16	Head rice recovery (%)	66.59	54.8	70.8	5.69	5.35	88.4	6.9	10.37
17	Kernel length (mm)	5.24	4.82	5.83	6.21	5.25	71.3	0.48	9.12
18	Kernel breadth (mm)	2.03	1.73	2.32	8.13	7.6	87.3	0.3	14.63
19	Length/Breadth Ratio	2.59	2.37	2.96	8	6.23	60.6	0.26	9.99
20	Kernel length after cooking (mm)	9.01	7.05	10.1	7.93	7.81	96.9	1.43	15.83
21	Kernel breadth after cooking (mm)	2.63	2.17	3.34	10.3	10.04	95.3	0.53	20.19
22	Kernel Elongation Ratio	1.72	1.44	1.93	7.25	6.37	77.3	0.2	11.54
23	Volume expansion ratio	4.85	4.22	5.34	7.55	3.87	26.3	0.2	4.09
24	Water uptake (ml)	193.91	141	264	16.5	16.17	95.7	63.21	32.6
25	Gel consistency (mm)	53.19	39.9	63.8	13.4	13.14	95.8	14.09	26.49
26	Alkali spreading value (mm)	4.21	2.89	6.94	34.6	34.4	99	2.97	70.5
27	Amylose content (%)	23.42	20.5	25.3	7.64	6.27	67.3	2.48	10.6

PCV = Phenotypic coefficient of variation **GCV = Genotypic coefficient of variation**

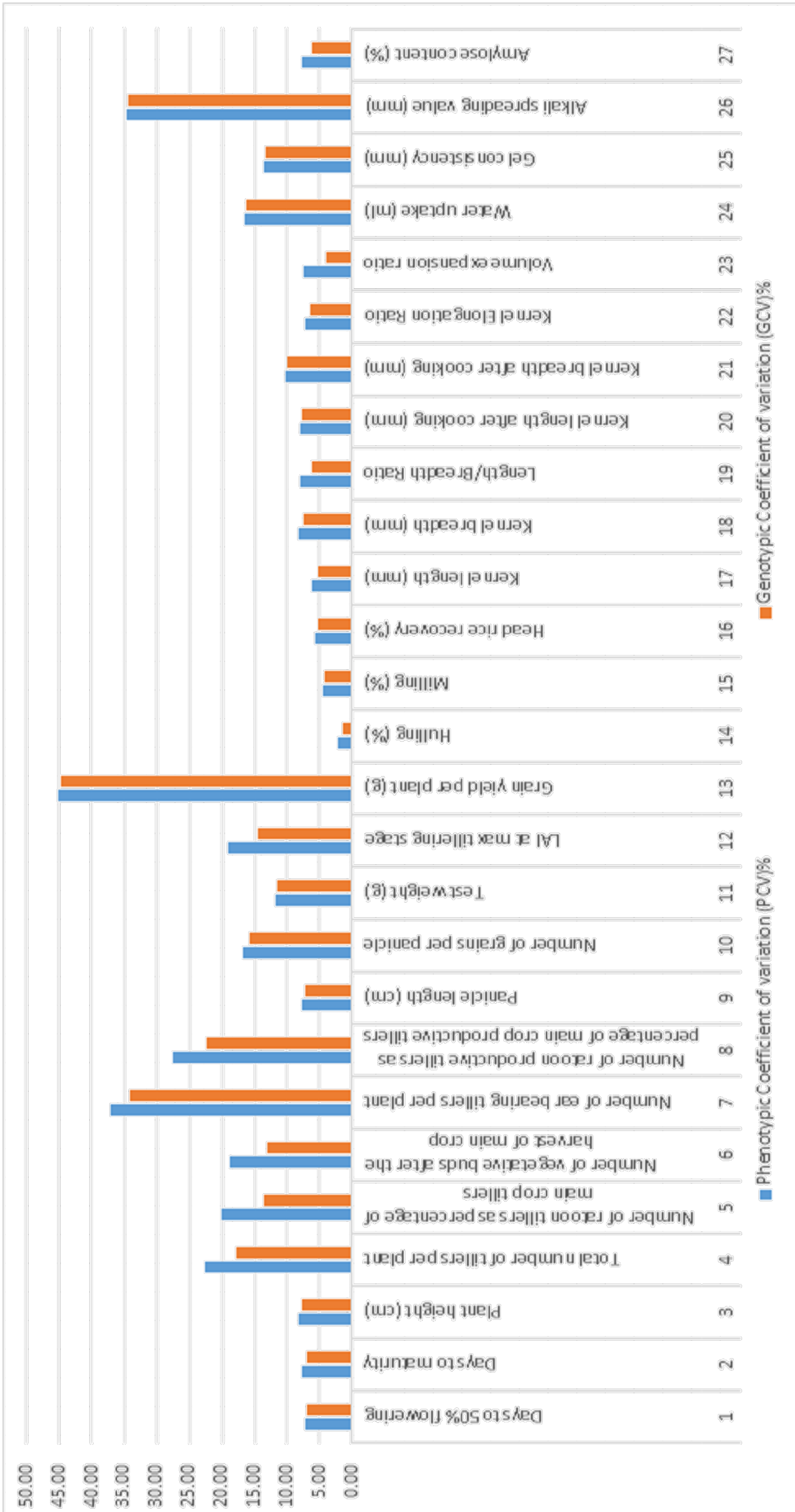

Fig 1. Phenotypic Coefficient of Variance (PCV) and Genotypic Coefficient of Variance (GCV) for grain yield, yield component, physio-chemical and cooking quality trait of Ratoon of 20 varieties Rice (*Oryza sativa* L.)

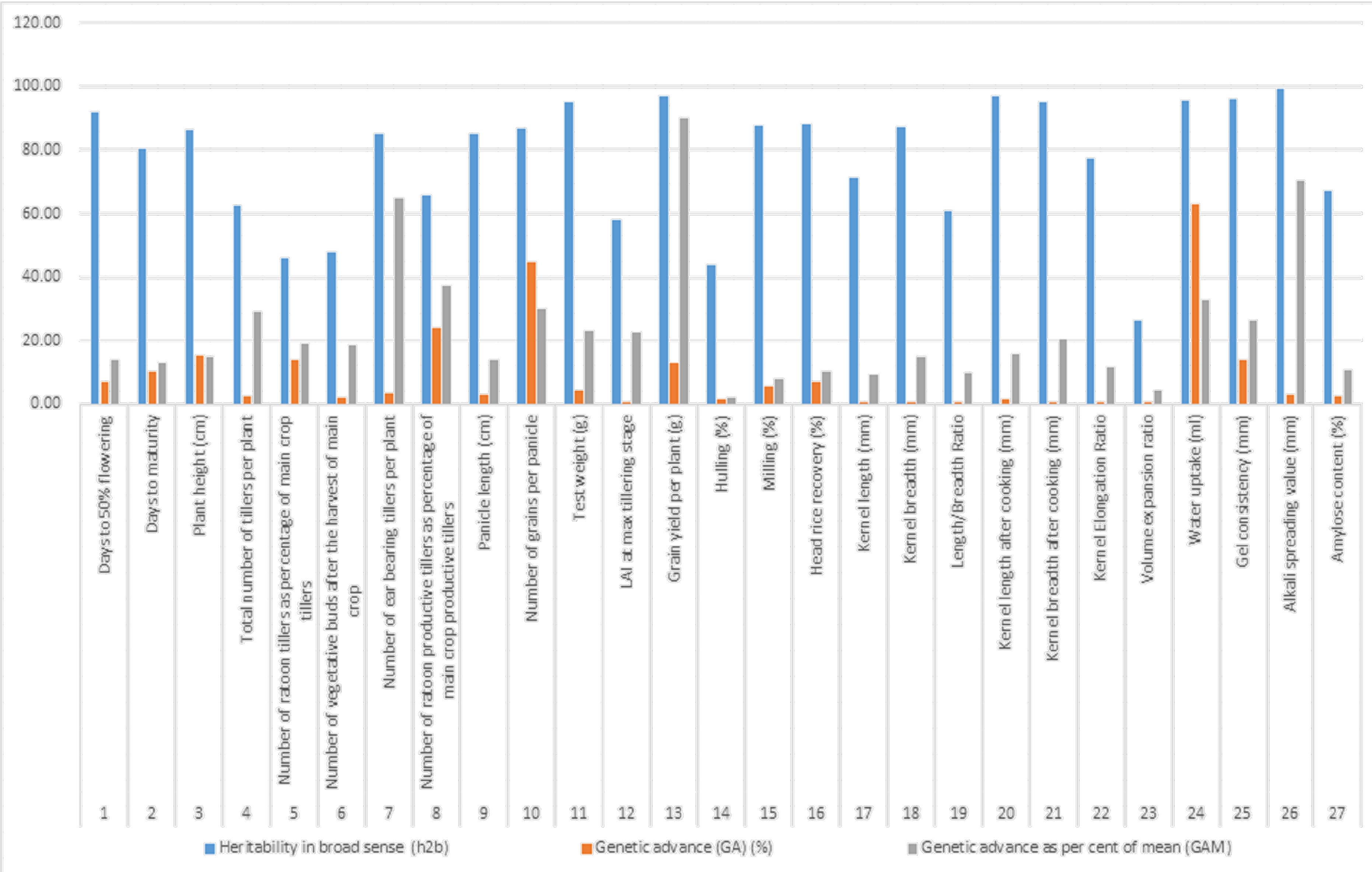

Fig 2. Genetic parameters (Heritability, Genetic Advance and Genetic Advance as per cent of mean) for grain yield, yield component, physio-chemical and cooking quality traits in 20 varieties of Rice (*Oryza sativa* L.)

mm to 2.32 mm), kernel length/breadth ratio (2.37 to 2.96), kernel length after cooking (7.05 to 10.13 mm), kernel breadth after cooking (2.17 to 3.34 mm), kernel elongation ratio (1.44 to 1.93), volume expansion ratio (4.22 to 5.34), water uptake (140.50 to 264.17 ml), gel consistency (39.92 to 63.83mm), alkali spreading value (2.89 to 6.94mm), amylose content (20.49 to 25.26%). The mean performance of 20 ratooned rice varieties, for 27 traits revealed existence of very high level of variability.

Genetic improvement in crops depends on the magnitude of genetic variation and heritability of characters. A wide range of phenotypic coefficient of variation (2.21 to 45.27%) and genotypic coefficient of variation (1.47 to 44.53%) was recorded for 27 traits studied (Table 2 Fig. 1). In the current investigation, estimation of genetic parameters revealed that the phenotypic co-efficient variation (PCV) was slightly higher than the genotypic co-efficient variation (GCV) for 27 traits studied, indicating that all the rice varieties interacted with environment. But, the slight variance between GCV and PCV, gives evidence of variability existing among the genotypes was mostly due to presence of genetic makeup. Similar observations for morphological traits were reported by [Barhate, *et al*., 2021, Chakrawarti *et al*., 2022., Devi *et al*., 2020., Gunturi Alekhya *et al*., 2024., Hima Bindu *et al*., 2024 and Kazuki Saito *et al*., 2024]. In the present study, grain yield per plant, number of ear bearing tillers per plant, number of ratoon ear bearing tillers as percentage of main crop ear bearing tillers and alkali spreading value recorded high GCV and PCV (*i.e*., >20%), simmilar results are found with [Chakrawarti *et al*., 2022, Garkoti, P & Pandey, D.P. 2022, Neha Chakrawarti *et al*., 2022 and Nusrat Jan & Subhash C Kashyap. 2020]. Moderate variability *i,e.*, PCV and GCV ranging between 10-20% was observed for total number of tillers per plant, number of grains per panicle, test weight, leaf area index at maximum tillering stage, kernel breadth after cooking, water uptake and gel consistency. The moderate GCV and PCV specifies the presence of relatively moderate variability for these traits, which could be exploited for development by selection in advanced generations.

Low GCV and PCV (*i.e* < 10%) was recorded for the traits, days to 50% flowering, days to maturity, plant height, panicle length per pant, hulling per cent, milling per cent (%), head rice recovery per cent, kernel length,m kernel breadth, kernel length (l)/breadth (b) ratio, kernel length after cooking, kernel elongation ratio, volume expansion ratio and amylose content. Low GCV and PCV for milling per cent was reported by [Gunturi Alekhya *et al*., 2024, Gupta *et al*., 2020, Hasan-Ud-Daula H & Sarker U. 2020, Ramakrishna *et al*., 2024 and Shutaro Shiraki *et al*., 2024]. Lower GCV and PCV results specifies narrow genetic base for these traits. Hence, hybridization or induced mutagenesis are required to widen genetic base followed by pedigree selection for the improvement for these characters.

Presence of high heritability of a trait is an index of transmission of parental characters to its progeny and estimation of heritability helps breeder in selection of elite cultivars from divergent population, hence knowledge about the heritability of the traits for breeding programme is essential. In this context the present study revealed heritability (broad sense) was high (*i.e* > 60%) for 22 yield and quality traits (Table 2 Fig. 2), Days to 50% flowering (91.90%), days to maturity (80.60%), plant height (86.40%), total number of tillers per plant (62.60%), number of ear bearing tillers per plant (84.90%), number of ratoon ear bearing tillers as percentage of main crop ear bearing tillers (65.80%), panicle length per pant (85.10%), number of grains per panicle (86.90%), test weight (94.90%), grain yield per plant (96.80%), milling per cent (87.60%), head rice recovery per cent (88.40%), kernel length (71.30%), kernel breadth (87.30%), kernel length/breadth ratio (60.60%), kernel length after cooking (96.90%), kernel breadth after cooking (95.30%), kernel elongation ratio (77.30%), water uptake (95.70%), gel consistency (95.80%), alkali spreading value (99.00%) and amylose content (67.30%). These results are in conformity with the results of [Gunturi Alekhya *et al*., 2024, Gupta *et al*., 2020, Hrishikesh *et al*., 2025, Shutaro *et al*., 2024, Swapnil *et al*., 2020 and Wenge *et al*., 2023]. Whereas moderate heritability (broad sense) (*i.e* 30-60%) was observed for traits number of ratoon tillers as percentage of main crop tillers (45.80%), leaf area index at maximum tillering stage (58.00%), hulling per cent (43.80%) and no. of vegetative buds after the harvest of main crop (47.90).

Evaluation of high genetic advance (*i.e* >20%) was revealed for number of ratoon productive tillers as percentage of main crop productive tillers (24.03), number of grains per panicle (44.75) and water uptake (63.21). The results are similar with the findings of [Burton, 1952, Devi *et al*., 2020, Hasan-Ud-Daula & Sarker 2020 and Johnson *et al*., 1955]. Moderate genetic advance as per cent of mean (i.e 10-20%) was observed for days to maturity (10.34), plant height (15.44), number of ratoon tillers as percentage of main crop tillers (13.93), grain yield per plant (13.21) and gel consistency (14.09). Low genetic advance (*i.e* <10%) was noticed for traits such as days to 50% flowering (6.87), total number of tillers per plant (2.53), number of vegetative buds after the harvest of main crop (1.94), number of ear bearing tillers (3.36), panical length (3.08), test weight (4.21), leaf area index at maximum tillering stage (0.48), hulling per cent (1.57), milling per cent (5.63), head rice recovery per cent (6.90), kernel length (0.48), kernel breadth (0.30), L/B ratio (0.26), kernel length after cooking (1.43), kernel breadth after cooking (0.53), kernel elongation ratio (0.20), volume expansion ratio (0.20), alkali digestion value (2.97) and amylose content (2.48). These results are in conformity with results of [Hasan-Ud-Daula H and Sarker U. 2020, Shutaro *et al*., 2024 and Vinod *et al*., 2020]

The estimates of heritability alone was ineffective for selection in any crop. Heritability studies coupled with genetic advance as per centage of mean, would be more useful [Devi *et al*., 2020, Gunturi Alekhya *et al*., 2024 and Gupta *et al*., 2020]. In the present study high heritability along with high genetic advance as percentage of mean was recorded for the characters *viz.,* total number of tillers per plant, number of ear bearing tillers per plant, number of ratoon ear bearing tillers as percentage of main crop ear bearing tillers, number of grains per panicle, test weight, grain yield per plant, kernel breadth after cooking, water uptake, gel consistency and alkali spreading value indicating the role of additive gene action in governing the inheritance of this character and offers the scope for improvement through simple selection. However, high heritability together with moderate genetic advance as per cent of mean was observed for days to 50% flowering, days to maturity, plant height, number of vegetative buds after the harvest of main crop, panicle length per pant, head rice recovery per cent, kernel breadth, kernel length after cooking, kernel elongation ratio and amylose content indicating the role of additive and non additive gene action in governing the inheritance of this character.

Moderate heritability in coupled with moderate genetic advance as per cent of mean was reported in number of ratoon tillers as percentage of main crop tillers, indicated the predominance of non-additive gene action. Moderate heritability coupled with high genetic advance as percentage of mean was observed for leaf area index at maximum tillering stage . While high heritability and low genetic advance as per cent of mean was found in milling per cent, kernel length and kernel length /breadth ratio indicated the role of non-additive gene action in governing the inheritance of this character. Similar results were reported by [Gunturi *et al*., 2024, Kazuki *et al*., 2024, Ramakrishna *et al*., 2024, Vinod *et al*., 2020 and Wenge *et al*., 2023]. Heritability is being exhibited due to favourable influence of environmental rather than genotypic and selection for such traits may not be rewarding and offers the scope for improvement through simple selection. Whereas, moderate heritability with low genetic advance as percentage of mean was reported in hulling per cent indicated the operation of both additive and non-additive gene actions in the inheritance of this trait and the desired results may not be obtained by simple selection, these results are in conformity with [Barhate *et al*., 2021, Devi *et al*., 2020, Gupta *et al*., 2020, Manish *et al*., 2023, Nusrat Jan & Subhash C Kashyap, 2020 and Shutaro *et al*., 2024] and Low heritability coupled with low genetic advance as percentage of mean was observed for volume expansion ratio, indicated that the character is highly influenced by environmental effects and selection would be ineffective.

CONCLUSION

Genetic variability is the prerequisite for any crop improvement programme in aspect of economically important yield attributing, physicochemical and quality traits. The analysis of variance (ANOVA) of 20 ratooned rice varieties showed significant differences for 27 characters, consisting of 10 yield attributing characters viz., days to 50% flowering, days to maturity, plant height (cm), total number of tillers per plant, number of ear bearing tillers per plant, panicle length per plant (cm), number of grains per plant, test weight (gm), leaf area index at maximum tillering stage, grain yield per plant; However, in ratoon crop, additionally another 3 traits contributing for ratoonability, were recorded viz., number of ratoon tillers as percentage of main crop tiller, number of vegetative buds after the harvest of main crop, number of ratoon ear bearing tillers as percentage of main crop ear bearing tillers, 6 physico-chemical traits such as hulling per cent, milling per cent, head rice recovery per cent, kernel length (mm), kernel breadth (mm), L/B ratio; and 8 cooking quality traits such as kernel length after cooking (mm), kernel breadth after cooking (mm), kernel elongation ratio, volume expansion ratio, water uptake value (ml), gel consistency, alkali digestion value (mm) and amylose content. The phenotypic coefficient of variation (PCV) values are higher than the genotypic coefficient of variation (GCV) values and the difference between them indicated that the little role of environment in the expression of these traits. A wide range of PCV (2.21 – 45.27%) and GCV (1.47– 44.53%) was resulted for 27 traits.

The presence of higher GCV and PCV for the trait grain yield per plant followed by number of ear bearing tillers per plant, alkali spreading value and number of ratoon productive tillers as percentage of main crop productive tillers revealed the presence of significant amount of variability in the varieties for the traits. From the study it was found that 20 ratooned rice cultivars had adequate amounts of variability for yield associated traits and physico-chemical quality traits.

The estimates of heritability and genetic advance as per cent of means were high for the characters *viz.,* total number of tillers per plant, number of ear bearing tillers per plant, number of ratoon productive tillers as percentage of main crop productive tillers, number of grains per panicle, kernel breadth after cooking, water uptake, gel consistency, alkali spreading value, amylose content and grain yield indicated the role of additive gene action in governing the inheritance of this traits and improvement of yield related and quality traits through simple selection may be rewarded. High heritability coupled with moderate genetic advance as per cent of mean was observed for days to 50% flowering, days to maturity, plant height, number of vegetative buds after the harvest of main crop, panicle length, head rice recovery per cent, kernel breadth, kernel length after cooking, kernel elongation ratio and amylose content revealed the preponderance of additive and non-additive gene action where recurrent selection followed by selection may be worthy for improvement for these traits.

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