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Performance Evaluation of different Traditional Paddy Varieties of Wayanad

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ABSTRACT

A field experiment was conducted at the Regional Agricultural Research Station, Ambalavayal, to evaluate the performance of various traditional paddy varieties in Wayanad. Observations were recorded for 20 selected traditional varieties, focusing on essential growth and yield characteristics. The study indicates, Ayiramkana demonstrated its superiority in grain yield, recording a significantly higher 5.11 t/ha, followed closely by Chenellu with 4.57 tonnes per ha, surpassing other cultivars. Conversely, Kuviginpoothali recorded a lower grain yield at 0.67 tonnes per ha. Chettuveliyan stood out among various traditional rice varieties with its impressive plant height, reaching 143.82 cm, comparable to Gandhakasala at 142.70 cm and Palthondi at 138.03 cm. Ayiramkana excelled in the number of productive tillers per hill, boasting a remarkable 10.80, a significant superiority over other varieties. In contrast, Kakkisala and Chettuveliyan displayed notably lower numbers at 4.63 and 5.27, respectively.

Keywords: Paddy varieties, Wayanad, Ayiramkana, Chenellu, Tillers

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INTRODUCTION

The wealth of genetic resources within Indian traditional rice encompasses diverse variants, particularly those endowed with medicinal and aromatic attributes. Traditional cultivars not only exhibit agriculturally valuable traits but also harbor a range of bioactive non-essential nutrients. Enriched with fiber, glutamic acids, calcium, vitamin D, thiamine, riboflavin, among others (Bhat and Riar, 2015, Verma *et al*., 2018), these traditional rice varieties offer a wholesome diet. Notably, they prove beneficial for individuals with diabetes and high blood pressure, given their low fat, sugar, and gluten content. Moreover, the presence of oryzanol, a compound known to inhibit fat formation, adds to their health benefits. Further, various nutritional components like endosperm, germ function, and bran, albeit in small quantities, exhibit distinct biological properties in different segments of traditional rice.

Kerala, once abundant in diverse traditional rice varieties thriving across its various agroclimatic regions, has witnessed a significant decline in paddy production due to the impact of climate change and a lack of robust market infrastructure. Consequently, many of these unique rice varieties have fallen out of cultivation. Despite this decline, a handful of farmers in Kerala still adhere to traditional rice farming methods. Notably, the Wayanad district, situated in the high range zone of the state, serves as a crucial repository for genetically preserved traditional rice types.

Despite the potential inherent in these cultivars, a scarcity of scientific data on varietal traits poses a challenge in comprehending their capabilities. This lack of information hampers efforts to gauge the performance and adaptability of these traditional rice varieties. Particularly in the high range zone, where these cultivars are concentrated, the study was undertaken to assess the performance of selected traditional rice varieties. This research aims to fill the existing knowledge gap and shed light on the market potential of these rice types, which, despite their significance, have been relatively underexplored in scientific research.

MATERIALS AND METHODS

The field experiment was conducted at the rice field of the Regional Agricultural Research Station, Ambalavayal, in the Wayanad district. Observations were systematically carried out during the Kharif season of 2020-21, adhering to the standard cultural practices recommended in the package of practices (KAU, 2016), and the experiment comprised three replications. The seedlings were planted in plots measuring 4 m x 4 m, with a plant spacing of 15 X 15 cm. To prevent cross-pollination and facilitate convenient data collection, a isolation distance of three meters was maintained between plots.

Regular observations were recorded from the field, focusing on 20 selected traditional varieties, to assess various growth and yield characteristics. The parameters studied included plant height, number of productive tillers per hill, number of panicles per hill, panicle length, number of grains per panicle, 1000 seed weight, dry grain yield, dry straw yield, and harvest index, totaling nine parameters. Adhering to the "Standard Evaluation System for Rice" (IRRI 1996), observations were made from 10 randomly selected plants in each replication,

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and the means were subsequently calculated for analysis.

Each crop received fertilizer at the recommended rate of 90:45:45 kg N, P2O5, and K2O ha-1, applied in the forms of urea, diammonium phosphate and muriate of potash, respectively. At sowing, the full dose of phosphorus, along with 50% of nitrogen and potassium, were applied. The remaining 50% of nitrogen and potassium was split into two applications: one during the panicle initiation (PI) stage and the other during the tillering stage. Additionally, a week before planting, five tons of farmyard manure per hectare were incorporated into the soil and thoroughly mixed using a cultivator.

Throughout the investigation, data on various parameters were recorded and subjected to statistical analysis using the analysis of variance (ANOVA) technique for a randomized block design, following the approach suggested by Panse and Sukhatme (1978). Significance was determined at the 0.05 level of probability, and the crucial difference (CD) was calculated to assess significance when the F-test value was found to be significant. This method was employed to ascertain the statistical significance of the recorded data.

Table 1: Plant height and number of productive tillers per hill of different traditional rice varieties

Sl. No	Variety	Plant height in cm	Number of productive tillers per hill
1	Adukkan	118.75	8.40
2	Ayiramkana	113.98	10.80
3	Chenellu	133.58	9.27
4	Chettuveliyan	143.82	5.27
5	Chomala	123.18	5.70
6	Edavaka	113.55	7.40
7	Gandhakasala	142.70	6.93
8	Jeerakasala	120.39	7.20
9	Kakkisala	114.34	4.23
10	Kothadan	123.42	7.10
11	Kodakuveliyan	117.60	8.00
12	Kuruva	119.17	7.57
13	Kuviginpoothali	141.20	6.03
14	Marathondi	132.75	8.33
15	Mullankaima	128.52	7.00
16	Palthondi	138.03	6.95
17	Punnadanthondi	115.88	6.25
18	Thonnuramthondi	101.01	6.80
19	veliyan	122.56	6.63
20	Velubala	134.51	6.50
	SE(m) ±	2.68	0.24
	C.D. (p=0.05)	8.01	0.69

RESULTS AND DISCUSSION

Plant height

Chettuveliyan exhibited the greatest plant height among the various rice varieties, reaching 143.82 cm, a height comparable to that of Gandhakasala at 142.70 cm and Palthondi at 138.03 cm. This height was significantly superior to the other varieties tested. Conversely, Thonnuramthondi displayed the lowest plant height at 101.01 cm, followed by Edavaka at 113.55 cm. The stature of rice plants is a pivotal agronomic trait directly impacting crop yield, as it is intricately linked to vegetative growth and dry matter production. Inadequate plant height can result in insufficient growth, ultimately diminishing the yield potential of the rice crop. Multiple factors, including light availability, spatial considerations, water supply, and nutrient levels, govern plant height. The notable height observed in Chettuveliyan may be attributed to the unique genetic characteristics of this particular variety, facilitating efficient solar energy utilization and optimal nutrient uptake throughout the growth stages. This, in turn, leads to a superior total dry matter production at harvest compared to other cultivars. These findings align with similar observations reported by Adheena *et al.* (2022), Baburaj *et al.* (2018), Gautam *et al.* (2018), and Susamma *et al.* (2005).

Number of productive tillers per hill

The determination of grains per unit area relies on both panicle density and the number of grains per plant, which is the cumulative count of grains on each panicle. Among these factors, the number of panicles emerged as the most critical component influencing yield, explaining approximately 87% of the variation in rice yield. The number of productive tillers per hill exhibited significant variability among the different varieties studied.

Ayiramkana stood out with the highest number of productive tillers per hill at 10.80, showcasing a significant superiority over the remaining varieties. In contrast, Kakkisala and Chettuveliyan displayed notably lower numbers at 4.63 and 5.27, respectively. The observed variations in tiller numbers between cultivars may be attributed to genetic inheritance stemming from differences in their parental origins. Enhanced vigor and expanded root characteristics in certain varieties contribute to the efficient utilization of natural resources, including photoperiod and solar radiations. Additionally, these varieties demonstrate improved nitrogen absorption for protoplasm synthesis, facilitating the conversion of tillers into productive tillers during later growth stages.

This aligns with findings reported by Sharma *et al.* (2019), Adheena *et al.* (2022), Baburaj *et al.* (2018), and Susamma *et al.* (2005).

Panicle length

Panicle length stands out as a pivotal factor influencing grain yield in rice, as it determines the total number of grains within the panicle and, consequently, the expected grain yield per unit area. Throughout the growth and development stages of rice, unfavorable conditions often lead to spikelet abortion at the top or base of the panicle, resulting in a reduction of fertile spikelet numbers and, subsequently, diminished grain yield.

Among the diverse varieties assessed, Jeerakasala exhibited the highest panicle length at 26.73 cm, surpassing all other varieties except Mullankaima (26.14 cm) and Palthondi (25.73

Table 2: Yield parameters of different traditional rice varieties

Sl no	Variety	Panicle length in cm	No of grains per panicle	Test weight in gm.	Grain yield in tonnes per ha
1	Adukkan	21.28	103.24	30.70	4.10
2	Ayiramkana	20.92	103.99	30.72	5.11
3	Chenellu	20.25	138.68	31.63	4.44
4	Chettuveliyan	22.42	115.94	28.09	2.97
5	Chomala	22.64	156.81	28.82	3.12
6	Edavaka	23.62	107.31	29.67	4.03
7	Gandhakasala	23.17	105.60	16.92	2.20
8	Jeerakasala	26.73	115.58	19.27	2.45
9	Kakkisala	21.17	147.28	21.52	2.09
10	Kothadan	22.88	152.47	28.52	2.22
11	Kodakuveliyan	20.93	114.16	23.61	3.83
12	Kuruva	23.41	115.87	22.45	4.00
13	Kuviginpoothali	17.84	92.61	30.37	0.67
14	Marathondi	22.43	153.44	12.56	3.16
15	Mullankaima	26.14	194.36	20.77	2.05
16	Palthondi	25.73	146.49	24.03	2.14
17	Punnadanthondi	20.50	164.27	26.83	2.48
18	Thonnuramthondi	20.83	114.85	28.91	3.28
19	veliyan	21.03	125.33	31.49	3.80
20	Velubala	21.17	140.24	31.15	2.17
	SE(m) ±	1.04	4.01	0.94	0.09
	C.D. (p=0.05)	3.00	11.54	2.70	0.26

cm), which were comparable. Conversely, Kuviginpoothali (17.84 cm) and Chenellu (20.25 cm) recorded lower panicle lengths. The elevated panicle length observed in Jeerakasala is likely attributed to improved growth and development, marked by effective utilization of natural resources and accelerated translocation of photosynthates from source to sink compared to other varieties. These findings align with similar observations made by Adheena *et al.* (2022), and Baburaj *et al.* (2018).

No of grains/panicle

The number of grains per panicle serves as a critical indicator of the source-to-sink conversion ratio in plants, representing a pivotal factor in determining grain yield. Mullankaima exhibited the highest number of grains per panicle at 194.36, showcasing significant superiority over other varieties. In contrast, Kuviginpoothali and Adukkan recorded lower numbers at 92.63 and 103.24, respectively.

These disparities can be attributed to variations in the length of the variety, heightened dry matter accumulation, and the prolonged retention of physiologically active green leaves. Such conditions create an environment conducive to increased photosynthetic activity and enhanced translocation of photosynthates from leaves to grains. Additionally, the observed differences may be influenced by the genetic makeup of each variety.

This aligns with similar findings reported by Chandrika *et al.* (2015) and Susamma *et al.* (2005), emphasizing the significance of these factors in understanding and enhancing grain yield in rice varieties.

Test weight

Chennellu exhibited significantly higher test weight at 31.63 g, leading among the varieties. Following closely were Veliyan at 31.49 g, Velumbala at 31.15 g, Kuviginpoothali at 30.37 g, Adukkana at 30.70 g, Ayiramkana at 30.72 g, and Edavaka at 29.67 g, all displaying notable test weights compared to the other varieties. Conversely, Marathondi recorded the lowest test weight at 12.56 g, with Gandakasala following at 16.92 g.

The observed variations in test weight were directly associated with seed size, reflecting the genetic characteristics of different rice genotypes. These findings align with the research of Adheena *et al.* (2022) and Baburaj *et al.* (2018), emphasizing the importance of genetic factors in influencing test weight and, by extension, the quality of rice varieties.

Grain yield

Ayiramkana demonstrated significantly higher grain yield at 5.11 tonnes per ha, emerging as the top-performing variety, followed closely by Chenellu at 4.57 tonnes per ha, surpassing other cultivars. In contrast, Kuviginpoothali exhibited the lowest grain yield at 0.67 tonnes per ha.

The elevated yield observed in Ayiramkana and Chenellu can be attributed to their higher total dry matter production, facilitated by efficient nutrient uptake through well-developed root systems. These varieties also displayed increased tiller production and larger leaf areas, enhancing photosynthesis during the growth season and resulting in higher yield attributes compared to other varieties. Conversely, the shorter stature of Kuviginpoothali may have contributed to prolonged tillering, leading to an increased number of unproductive tillers, ultimately elevating spikelet sterility and reducing grain yield.

These findings align with research conducted by Adheena *et al*. (2022), Kiran *et al*. (2015), Chandrika *et al*. (2017), and underscoring the consistent influence of these factors on rice grain yield.

CONCLUSION

Lack of suitable paddy varieties having higher response to inputs and climatic change are the major barriers of crop production in highland areas of Kerala. The results of field experiment conducted during 2020-21 to evaluate performance of different traditional paddy varieties of Wayanad showed that among the different varieties, Ayiramkana and Chenellu recorded most favorable outcomes in terms of growth parameters, yield parameters and yield compared to others. Genetical makeup, higher nutrient uptake, effective utilization of available resources and better translocation of photosynthates from source to sink made them superior over other varieties. Hence these two rice cultivars exhibit superior characteristics, making them recommended choices for cultivation in the highland areas of Wayanad.

REFERENCES

Adheena AR, Elsy CR and Sreelatha AK. 2022. Indigenous aromatic rice genotypes (*Oryza sativa* L.) of Wayanad district in Kerala. Performance in varied environmental conditions. *The Pharma Innovation Journal* **11**(7):461-464.

Baburaj TS, Geetha S Pillai, Devadas VS and Sunil KM**.** 2018. A Comparative Study on Yield Parameters of the Indigenous Paddy Varieties Prevailing in Wayanad District of Kerala State, India. *International Journal of Current Advanced Research* **7**(3):11265-11267.

Bhat FM and Riar CS. 2015. Health Benefits of Traditional Rice Varieties of Temperate Regions. *Medicinal and aromatic plants* **4**(3):198.

Chandrika M, Umadevi, Ramulu V and Ramana V M.2017. Evaluation of different varieties of aerobic rice (*Oryza sativa* L.) under different fertigation levels on growth and yield parameters. *Int. J. Curr. Microbiol. App. Sci*. **6**(5):2793- 2801.

Gautam A, Srivastava VK, Verma VK and Alok P. 2018. Effect of varying seed rates and row spacing on growth yield attributes and yield of dry direct seeded rice. *Int. J. Agril. Sci.* **10**(7): 5788-5790.

IRRI [International Rice Research Institute].1996. Standard Evaluation System for Rice (**IV edn**.). International Rice Research Institute, Los Banos, Philippines.

KAU (Kerala Agricultural university).2016. *Package of practices Recommendations*: Crops (**XV**th) edition.

Kiran BO, Amaregouda A and Patil RP. 2015. Effect of planting methods and nitrogen levels on tissue nitrogen content, yield and yield components in rice cultivars. *Res. J. Agric. Sci*. **6**(3): 579-582.

Panse VG and Sukhatme PV.1978. Statistical methods for Agricultural works. Indian Council of Agricultural Research. New Delhi.Pp.361

Sharma V, Gunjan P, Singh YP and Singh PK. 2019. Growth, yield and yield contributing factors of rice crop as influenced by different level and methods of irrigation in tarai region of Uttarakhand, India. *Int. J. Curr. Microbiol. App. Sci.* **8**(4): 1088-1098.

Susamma PG, Dijee Bastian N V, Radhakrishan, Aipe K C.(2005). Evaluation of aromatic rice varieties in Wayanad, Kerala**.** *Journal of Tropical Agriculture* **43** (1-2): 67-69.

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