



A COMPARITIVE STUDY ON YIELD PARAMETERS OF THE INDIGENOUS PADDY VARIETIES PREVAILING IN WAYANAD DISTRICT OF KERALA STATE, INDIA

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ABSTRACT

Wayanad district, the one and only Plateau of Kerala State of India, is well known for its own traditional paddy varieties. Once the area was rich with more than 100 traditional varieties and at present it is limited to less than twenty. With the increase in population and the related changes in the life style most of the indigenous varieties are on the verge of threat and a considerable number of them were lost forever. In this context the present study was conducted following the "Standard Evaluation System for Rice" (IRRI). Significant yield parameters of the 12 indigenous paddy varieties prevailing in Wayanad were considered. One-way Analysis of variance was done. All the variables, except the number of effective tillers, showed significant differences between varieties. Cluster analysis was also done based on the response in different yield parameters and grouped into three. The parameters like plant height, number of grains per panicle, dry grain yield and dry straw yield were found to be higher values for cluster 1. Consequently the varieties belonging to cluster 1 are measured superior to other two clusters.

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INTRODUCTION

The rice plant *Oryza sativa L.* is a member of the family *Poaceae*. It is one of the leading cereal crops of the world and a major source of nutrition. It forms the staple food of more than half of the world's population (Bashir et al 2010). Straw, a byproduct of this crop is the major source of fodder. It was the major thatching material for houses about a half century back. Besides, the importance of this crop in maintaining ecological balance and water recharging is also well known.

Different from own any other countries of the world India is renowned for its own traditional paddy cultivation system (Chandra et al. 2006). Kerala State is also distinguished for its own system of traditional paddy cultivation. But with the advent of chemical fertilizers and insecticides the traditional agricultural practices and cultivation system started to erode gradually. Invasion of the seeds of high yielding varieties (HYV) made this process faster. The climate change and labour shortage added much to the problem. Consequently most of our indigenous rice varieties are getting lost. A considerable number of them were lost forever. (Baburaj et al., 2016)

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Lack of scientific data on varietal characters and knowledge on cultivation practices of the varieties are the major hurdle for cultivation and conservation activities (Yoshida, 1981). This causes difficulties and confusions to identify even the existing traditional varieties. Present study is an attempt to compare the yield parameters of the Indigenous paddy varieties prevailing in Wayanad district.

MATERIALS AND METHODS

A sample survey was conducted among the traditional farmers of three Thaluks of wayand district of kerala state of India, namely Sulthan Bathery, Vythiri and Mananthavady. From Suthan Bathery Thaluk, traditional farmers of Ambalavayal, Meenangadi and Nenmeni grama Panchayaths were selected. Kaniyambetta, Kottathara and Muttill were the panchayaths selected from Vythiri Thaluk. Farmers of Thavinjal, Thondernad and Vellamunda Pachayaths were selected from Mananthavady Thaluk. The sampling Panchayaths were selected in such a way representing all the traditional paddy cultivating areas of the District.

Out of the samples collected from the survey, 12 most important varieties prevailing in Wayand such as *Adukkan*, *Chennellu*, *Chettuveliyan*, *Chomala*, *Gandhakasala*, *Jeerakasala*, *Kalladiyaryan*, *Kodakuveliyan*, *Kuruva*, *Marathondi*, *Punnadanthondi* and *Veliyan* were selected for the study.

The study was conducted in a farmer’s field of Ambalavayal grama Panchayath belongs to Sulthan Bathery Taluk of Wayanad District. Observations were carried out during *Kharif* season of 2012-13 following standard cultural practices recommended in package of practices (KAU, 2007). The seedlings were planted in 1.5 X 10 m sized plots with a spacing of 15 X 15 cm between plants. A space of two meters was left between plots to sidestep the chance of cross pollination and also for the convenience of data collection (Chandra *et al.* 1997). The crop in the farmer's field was monitored regularly from the date of sowing till the date of harvest. In order to describe all the relevant yield parameters, observations were recorded regularly from the field on 13 important yield characteristics of the varieties. The observations were made following the “Standard Evaluation System for Rice” (IRRI, 1996) from nine randomly selected plants in each replication.

Parameters which had direct or indirect influence on yield of the crop were selected for the study. Plant height, number of effective tillers, width of the leaf blade, days to heading, panicle length, dry panicle weight, number of grains per panicle, length of the rice grain, dry weight of 1000 paddy grains, dry weight of 1000 rice grains, dry grain yield, dry straw yield and crop duration are the 13 parameters studied. One-way analysis of variance was carried out. Cluster analysis was also done for grouping different varieties based on the response in different yield parameters.

RESULTS AND DISCUSSION

Significant difference was noted in all the 13 yield parameters studied except in the case of number of effective tillers (Table 1).

Table 1 Comparison of different yield Parameters among varieties

Variety	Plant height (cm)	No. of effective Tillers	Width of the leaf blade (mm)	Days to heading	Panicle length (cm)
Adukkkan	125 ± 2.08	8.33 ± 1.45	8.33 ± 0.88	119.33 ± 0.88	21.33 ± 0.64
Chennellu	130.33 ± 2.96	8 ± 0.58	7.67 ± 0.67	104.33 ± 0.33	20.47 ± 0.2
Chettuveliyan	146 ± 2.08	5.27 ± 0.9	8.67 ± 1.2	136.67 ± 0.88	22.33 ± 0.66
Chomala	124.33 ± 3.48	5.7 ± 0.15	7.33 ± 0.88	126.33 ± 1.2	22.7 ± 1.29
Gandhakasala	106.33 ± 5.46	5.33 ± 0.23	5 ± 0.58	118 ± 0.58	21.37 ± 0.61
Jeerakasala	122.67 ± 3.48	6.03 ± 0.58	8 ± 0.58	132.33 ± 2.33	25.93 ± 0.88
Kalladiyaryan	109.33 ± 2.19	8.3 ± 0.85	7 ± 0.58	101.67 ± 1.2	18.43 ± 0.62
Kodakuveliyan	111.67 ± 3.84	8.3 ± 0.89	7.33 ± 0.33	105.33 ± 0.33	20.43 ± 0.46
Kuruva	119.33 ± 1.67	7.43 ± 0.87	6 ± 0.58	112.67 ± 1.2	23.57 ± 0.38
Punnadanthondi	119.33 ± 2.6	6 ± 0.58	11 ± 0.58	119.33 ± 1.45	21.4 ± 0.32
Marathondi	133 ± 3.22	8.47 ± 1.81	7 ± 0.58	117.67 ± 1.45	22.53 ± 0.52
Veliyan	124.67 ± 2.33	6.4 ± 0.87	11.33 ± 1.2	105 ± 0.58	21.93 ± 0.43
F-value	12.284**	1.931	5.691**	93.764**	8.140**

Table 1 Comparison of different yield Parameters among varieties (Continued..)

Variety	Dry panicle weight (gm)	No. of grains per panicle	Length of the rice grain (mm)	Dry weight of 1000 paddy grains (gm)
Adukkkan	3.31 ± 0.01	73 ± 3.61	8.33 ± 0.3	36.78 ± 0.97
Chennellu	2.15 ± 0.02	73.33 ± 5.7	7.83 ± 0.38	29.15 ± 1.92
Chettuveliyan	1.62 ± 0.01	103.33 ± 10.71	7.97 ± 0.29	28.61 ± 2.08
Chomala	3.22 ± 0.12	101 ± 6.43	6.2 ± 0.06	29.73 ± 1.03
Gandhakasala	1.12 ± 0.07	38.67 ± 4.06	6.33 ± 0.26	20.65 ± 0.97
Jeerakasala	1.84 ± 0.06	62.33 ± 4.91	8.07 ± 0.15	21.3 ± 1.04
Kalladiyaryan	1.54 ± 0.06	48.67 ± 3.53	8.33 ± 0.29	33.14 ± 1.02
Kodakuveliyan	1.19 ± 0.15	63.33 ± 3.84	7.53 ± 0.5	23.26 ± 0.74

Kuruva	3.1 ± 0	86 ± 4.73	2.27 ± 0.29	22.81 ± 1.41
Punnadanthondi	2.66 ± 0.15	86.67 ± 5.36	7.5 ± 0.17	30.13 ± 0.53
Marathondi	1.61 ± 0.11	84.67 ± 7.13	8.43 ± 0.26	31.56 ± 1.48
Veliyan	3.07 ± 0.07	112.67 ± 4.63	8.07 ± 0.15	29.88 ± 1.2
F-value	92.642**	15.198**	37.814**	15.495**

Table 1 Comparison of different yield Parameters among varieties (Continued..)

Variety	Dry weight of 1000 rice grains (gm)	Dry grain yield (gm/m ²)	Dry straw yield (gm/m ²)	Crop duration in days
Adukkkan	29.67 ± 2.03	481.53 ± 9.53	732.33 ± 5.93	168 ± 3.22
Chennellu	23.02 ± 0.7	950.33 ± 15.98	931.67 ± 12.6	172.67 ± 2.6
Chettuveliyan	23.84 ± 1.72	318 ± 9.24	165.67 ± 6.01	175 ± 2.65
Chomala	24.14 ± 0.89	995.33 ± 5.9	985 ± 6.51	177 ± 1.73
Gandhakasala	17.32 ± 0.55	255.4 ± 6.96	418.33 ± 12.55	184.67 ± 2.33
Jeerakasala	17.84 ± 0.21	234.67 ± 10.48	389.67 ± 10.73	181.67 ± 1.45
Kalladiyaryan	25.9 ± 0.56	374.33 ± 3.53	434.67 ± 5.78	150.67 ± 0.88
Kodakuveliyan	18.49 ± 0.49	656 ± 9.64	503.67 ± 8.37	151 ± 2.08
Kuruva	19.85 ± 0.82	374 ± 12.7	433.67 ± 18.46	160 ± 1.16
Punnadanthondi	25.52 ± 0.85	238.67 ± 8.01	579.67 ± 5.55	159.67 ± 1.2
Marathondi	25.46 ± 2.59	1036 ± 18.72	1041.67 ± 9.82	169 ± 0.58
Veliyan	25.14 ± 0.41	678.2 ± 11.39	559 ± 13	174.33 ± 1.2
F-value	10.011**	779.70**	681.495**	33.845**

No significant difference in the number of effective tillers was noted between the varieties. The low F-value shows a case where group means are close together (Low variability) relative to the variability within each group. The high F-value shows a case where the variability of group means is large relative to the within group variability (High variability).

As there are 12 varieties for making homogenous groups, cluster analysis was done for grouping them based on the response in different yield parameters. Hierarchical cluster analysis was also done using average linkage between groups. Allowing 20 percent variability within each cluster, 12 varieties are grouped into three clusters (Fig. 1). Cluster 1 contains three species namely *Chomala*, *Marathondi*, and *Chennellu*. Cluster 2 contains *Kodakuveliyan*, *Veliyan* and *Adukkkan*. Varieties like *Chettuveliyan*, *Gandhakasala*, *Jeerakasala*, *Kalladiyaryan*, *Kuruva* and *Punnadanthondi* were grouped under Cluster 3.

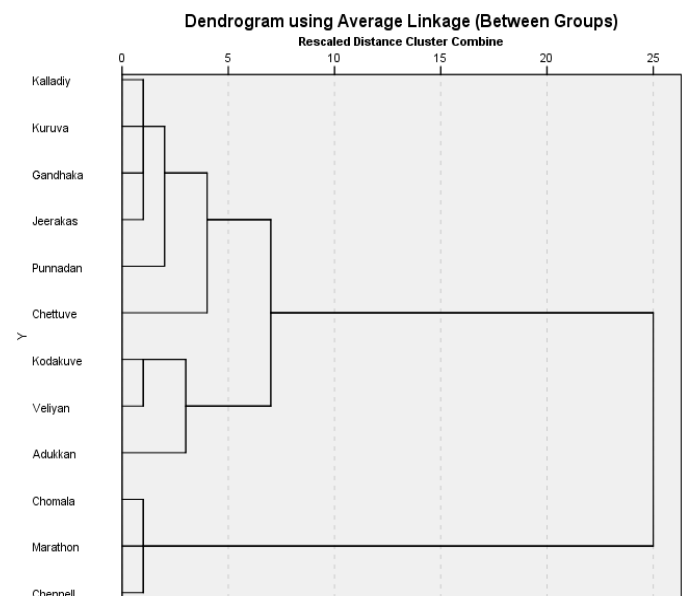


Figure 1 Dendrogram using average Linkage between groups

Table 2 Cluster means of each parameters

Parameters	Cluster 1	Cluster 2	Cluster 3
Plant height (cm)	125.7	121.0	120.4
No. of effective Tillers	6.7	7.1	7.0
Width of the leaf blade (mm)	8.0	9.2	7.2
Days to heading	116.8	112.0	118.3
Panicle length (cm)	21.5	22.2	22.0
Dry panicle weight (gm)	2.5	2.0	2.0
No. of grains per panicle	85.1	74.5	71.6
Length of the rice grain (mm)	6.9	8.3	6.9
Dry weight of 1000 paddy grains (gm)	30.1	28.2	26.4
Dry weight of 1000 rice grains (gm)	24.3	23.6	22.0
Dry grain yield (gm/m ²)	676.1	568.4	460.3
Dry straw yield (gm/m ²)	712.1	610.0	514.6
Crop duration in days.	168.9	165.3	169.6

Based on the analysis it could be inferred that parameters like plant height, number of grains per panicle, dry grain yield and dry straw yield were found to be higher for the varieties grouped under cluster 1. Accordingly the varieties belong to cluster 1 are considered superior to the varieties of other two clusters.

CONCLUSION

The present study concludes that varieties belonging to cluster 1 namely Chomala, Marathondi, and Chennellu are superior to the varieties grouped under Cluster 2 and 3 with respect to yield. Pertaining to yield characteristics, varieties coming under the cluster 3 are grouped as the least performed ones. Anchored in the present study it may also conclude that, in the case of traditional paddy varieties, yield of the crop is not in proportion to duration of the crop.

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