

**ASSESSMENT OF GENETIC DIVERSITY AMONG SUWANDAL RICE (*ORYZA SATIVA* L.) ACCESSIONS BASED ON MORPHOLOGICAL, MOLECULAR AND PHYSICOCHEMICAL CHARACTERISTICS**

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**EXTENDED ABSTRACT**

Plant Genetic Resources Centre (PGRC), Sri Lanka collected and conserves two thousand four hundred seven traditional rice accessions under the six hundred eighty four different cultivars names (gene bank information). Different historical records revealed that traditional rice varieties were revered for their nutritional and medicinal properties. Recently demand for traditional rice cultivars have been increased and consequently extend of cultivation also considerably increased. According to the farmer preference and consumer demand seven traditional rice cultivars have been identified for cultivation. However, due to poor quality seeds and large number of accessions coming under one cultivar name correct identification and quality seed paddy production with identical qualities are prerequisite.

*Suwandal* is one of the popular traditional rice cultivars with a special kind of aroma and taste. At present 14 rice accession under the name of *Suwandal* were explored from different parts of the country and conserved at PGRC genebank. However, systematic studies were not conducted to study the diversity among these accessions and identify the repetitions. Therefore, present study was conducted to characterize these accessions using morphological, molecular and physicochemical characters to identify the available diversity, and identify *suwandal* accessions with identical characters for quality seed production and popularize among farmers.

*Suwandal* rice accessions which conserved at seed gene bank of PGRC were established in the in *Yala* 2015 and *Maha* 2015/16 in the field at PGRC. Twenty six qualitative and seventeen quantitative morphological characterized data were recorded at vegetative stage, flowering stage and at maturity according to the standard descriptor for rice (PGRC, 1995). DNA was extracted from two weeks old immature leaves of these *Suwandal* accessions using modified CTAB method and molecular characterization was

done using 30 microsatellite markers (Wasala *et al.*, 2012). Physical and physicochemical quality characterization was done at Rice Research and Development Institute, Batalagoda (Rebeira *et al.*, 2014). Cluster analysis and Principle Component Analysis (PCA) were done for morphological data. Molecular data were analyzed using POWERMARKER V 3.25 software. These data were used to construct a phylogenetic tree based on Unweighted Paired Group Method with Arithmetic Average (UPGMA) algorithm. Analysis of variance was performed for physicochemical data and mean separation was done according to the Turkey's T test.

Culm strength (i.e. lodging resistance) and culm angles, leaf pubescence, leaf angle, ligule shape, panicle characters, floral and seed characters were varied among the accessions. Considerable variation of seed coat colour was shown. Quantitative data revealed that these *Suwandal* accessions belong to the different maturity groups. Distinct variations were observed in plant height, ligule length, grain weight, grain length and width. The first 4 principle components explained 91.5% of the total variability.

According to the molecular analysis a total of 82 alleles were detected at 30 microsatellite markers across 14 Suwandel rice accessions. Out of these 30 SSR loci 28 loci showed polymorphism. Allele richness varied from 1 (RM 255 & RM 228) to 5 (RM 202) alleles across tested populations. A high level of genetic diversity existed among 30 loci studied across 11 *Suwandel* rice accessions. It ranged from 0.00 to 0.75 with an average of 0.44. The PIC value of each marker could be evaluated basis of allele frequencies. It varied from 0.0 (RM255 and RM228) to 0.71(RM202) with the average of 0.38.

Genetic distances showed considerable variation and none of the accession pair showed zero genetic distance. It concludes that even though accessions identified with the similar name there were no duplicates in genetic level In this study tested accessions were obtained from various agro- climatic regions of the country and evolve through long process under different environmental conditions hence genetic divergence can be occurred. Similar results were obtained by Ahmed *et al.*, (2015) for different accessions of *Dhaliboro* rice cultivar at Bangladesh

Physicochemical properties of tested accessions varied among the accessions. Except AC05420 rest of the tested accessions grouped into the high (>25%) amylose content. Gel consistency which indicates the texture of cooked rice of these tested accessions ranged from 3.4 to 5.1. Except AC04197 (5.1) rest of the accessions gave high gel consistency value (<4). Except AC12844 rest of the accessions showed intermediate

gelatinization temperature values. Percentage free radical scavenging activity value ranged from 34.6 (AC13300) to 87.5 (AC05420). AC05420 and AC4595 showed over 87 % free radical scavenging activity.

Based on morphological molecular and physicochemical characterized data, no duplicates were identified among these conserved Suwandal accessions. AC12844 showed distinctly different characters and it can be a miss identified cultivar. AC13300, AC11340 and AC12827 showed close relationship both under morphological and molecular data which comes under 3.5 month age group. AC04197, AC04595 & AC04802 made another group with close relationship which comes under 5 month age group. Physicochemical activity of these tested accessions showed significant variation among the accessions and it is not reflected by the morphological and molecular diversity.

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