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Evaluation of traditional varieties of finger millet (*Eleusine coracana* (A.) Gaertn.)

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Abstract

This experiment was conducted with 15 traditional and most adopted finger millet (*Eleusine coracana* (L.) Gaertn.) varieties to assess the field level variability for yield and associated morphological traits. The experiment was laid out in a Randomized Block Design with three replications, recording traits such as days to heading and maturity, plant height, ear exertion, number of fingers per head, finger width, flag leaf blade length, and single plant yield. Significant variation was observed among genotypes, indicating strong genetic diversity. Paiyur 1 recorded the highest yield (28.2 g), followed by CO 10 (25.6 g), attributed to superior traits like higher finger number, wider fingers, and longer flag leaves. Early maturity was noted in Shivalli ragi, making it suitable for drought-prone conditions. The findings highlight the importance of traditional varieties as valuable genetic resources for breeding high-yielding and climate-resilient finger millet cultivars.

Keywords: *Eleusine coracana*, finger millet, Ragi

1. Introduction

Millet is a minor, annual cereal grasses with small seeds that are characterized by their capacity to thrive in much less fertile soil and for their adaptation to withstand hot and arid environments. Finger millet (*Eleusine coracana* L.) also known as African millet and commonly called “ragi” in India. The grains of ragi are packed with fibre and calcium, are extremely beneficial due to its enormous health benefits. This small millet is wholesome nutrient package and recommended for all age groups. In India, it is commonly grown for human consumption and also in many other arid and semi-arid areas of the world. Finger millet or ragi (*Eleusine coracana*) was native of Ethiopia but spread out to Asia few thousand years ago. Now a-days, there is a sudden increase in the demand of minor millets due to their health benefits and ragi is one of them. Finger millet (*Eleusine coracana*) is a highly nutritious grain known for its potential in managing type 2 diabetes (T2D). Finger millet contains high levels of natural antioxidants like flavonoids, which can reduce oxidative stress and block α -amylase and α -glucosidase, the key enzymes involved in sugar digestion. Studies showed that it performed better than some diabetes drugs in inhibition of these enzymes. These benefits make finger millet a strong candidate for use in healthy, diabetes-friendly foods. With the increasing trend in consumption of ragi among rural and urban populations opened the gateway for the development new varieties in ragi. This research project was initiated to identify the high yielding, genetically variable varieties which can also be used as parental lines for further breeding programmes.

2. Materials and Methods

2.1. Evaluation at farm level

The landraces were collected from the following five locations viz., Tamil Nadu, Bengaluru, Karnataka, Coimbatore and Virudhunagar. The 15 genotypes listed in the Table.1 form the resource material for carrying out the diversity analysis. The materials were sown in Randomized Block Design with three replications at south farm of Karunya Institute of Technology and Sciences, Coimbatore. Each material was sown in three rows of 2.0 m length with 20 cm between rows and 10cm between plants. The experimental plot was managed as per farmers' practice.

The performances of resource materials were evaluated. To compare genotypes without bias, a homogenous plant population was maintained in each row. Ten plants were tagged at random per genotype and replication to record observations on yield and yield attributing eight characteristics viz., days to 50% heading, days to 80% maturity, ear exertion (cm), plant height (cm), number of fingers per head, finger width (mm), length of flag leaf (cm) and yield per plant (gm) were recorded. These traits were

considered for evaluating the yield potential of finger millet genotypes.

2.2. Analysis of On-Farm data

Data on traits were subjected to statistical analysis. The statistical package used for analysis was Genstat Discovery Edition 4.0 at 0.05 level of significance. The mean performances of traditional varieties of Finger millets are summarized in Table. 2.

Table 1: List of varieties of ragi used in this experiment and their site of collection

S. No.	Name of landraces/traditional varieties	Site of collection	Seed colour
1	CO-10	TNAU	Light brown
2	Indaf 9	University of agricultural sciences Bengaluru.	Light brown
3	Paiyur 1	TNAU	Light brown
4	Sharavathi ragi	Mandya, Karnataka	Brown
5	Ragalli	Mandya, Karnataka	Brown
6	Shivalli ragi	Mandya, Karnataka	Brown
7	Kempu ragi	Mandya, Karnataka	Dark Brown
8	Hasirukkadi ragi	Mandya, Karnataka	Brown
9	Bennemudde ragi	Mandya, Karnataka	Brown
10	Billigada ragi	Mandya, Karnataka	Brown
11	Gai ragi	Seengampathi, Coimbatore	Brown
12	Ney ragi	Seengampathi, Coimbatore	Light Brown
13	Chadivayal ragi	Chadivayalpathi, Coimbatore	Brown
14	Mullangadu ragi	Mullangadu, Coimbatore	Light Brown
15	Thiruchuzhi	Thiruchuzhi, Virudhunagar	white

Table 2: Mean performances of traditional varieties of finger millet

Genotype Ragi	DFH	DEM	EE	PH	NFH	FL	FW	LFL	SPY
CO 10	59.0	111.0	5.3	106.0	7.3	8.7	0.7	28.8	25.6
Indaf 9	63.0	119.0	4.9	111.0	6.3	8.0	0.7	27.8	22.8
Paiyur 1	56.0	110.0	5.7	103.3	8.3	9.3	0.8	30.4	28.2
Sharavathi ragi	71.6	96.2	8.0	80.5	8.4	8.8	3.4	35.4	11.2
Ragalli	76.5	99.2	7.6	80.4	7.5	7.9	2.9	36.3	15.5
Shivalli ragi	29.8	95.4	8.5	80.8	6.7	8.2	3.3	35.3	15.0
Kempu ragi	31.0	105.6	8.1	82.0	5.6	7.7	2.8	29.3	16.1
Hasirukkadi ragi	76.0	101.9	8.0	79.5	5.6	8.0	2.4	33.8	14.4
Bennemudde ragi	75.5	102.6	8.1	81.9	7.4	9.2	2.3	33.7	11.1
Billigada ragi	74.3	102.9	8.3	80.3	6.5	9.5	2.8	33.6	14.6
Gai ragi	80.3	112.3	8.0	87.3	6.6	8.4	2.3	23.7	12.6
Ney ragi	81.5	111.5	8.1	59.5	4.4	.3	2.5	34.5	13.2
Chadivayal ragi	75.0	98.8	8.6	80.6	6.7	7.8	2.4	32.7	14.3
Mullangadu ragi	74.6	98.3	7.7	82.2	4.6	7.6	2.5	32.9	9.3
Thiruchuzhi keppai	79.2	106.8	7.8	84.8	7.6	8.1	3.4	32.0	9.1

Note: DFH-Days to 50% Heading, DEM: Days to 80% Maturity, EE: Ear Exertion (cm), PH: Plant Height (cm), NF/H-Number of Fingers/Head (cm), FL: Flower length; FW-Finger Width (cm), LFL-Length of Flag Leaf (cm), SPY-Single plant yield.

3. Results and Discussion

All the experimental materials showed erect growth habit. The mean values of quantitative and qualitative characters of finger millet are given in Table.2. The research measured Days to 50% Heading (DFH) and Days to 80% Maturity (DEM) between three ranges which extended from 29.8 to 81.5 days and 95.4 to 119.0 days respectively. Shivalli ragi showed the fastest growth among all genotypes. The research observed that plant height (PH) measurements ranged between 59.5 cm (Ney ragi) and 111.0 cm (Indaf 9) which demonstrated different height ranges. Sharavathi ragi achieved its highest yield through its measurement of 8.4 fingers per head while Billigada ragi generated its longest fingers which measured 9.5 centimeters. The Single Plant

Yield (SPY) reached its highest point in Paiyur 1 (28.2 g) and CO 10 (25.6 g) while Thiruchuzhi keppai produced the smallest yield with its output of 9.1 g. The results show that these traits have strong genetic control which enables breeders to improve crops through selective breeding. The combination of mature height between moderate and maturity height between moderate, which together with the SPY performance of Paiyur 1 and CO 10 indicates that these plants have developed an effective balance for distributing their biomass. The extreme earliness of Shivalli ragi makes it a valuable candidate for drought-prone environments or short-cropping windows. The high finger number and width of Sharavathi ragi and Thiruchuzhi keppai make them suitable as parent plants in hybridization programs which seek to enhance finger millet sink capacity. The researchers will use these genotypes to create high-yielding, climate-resilient varieties which will meet specific agro-ecological needs.

The maximum number of fingers per head contributed for single plant yield. These finding was in accordance with the results of Lule *et al.*, (2012) ^[3] and Patil (2019) ^[4]. The accessions which were rich in minerals can be utilized as parental lines in quality breeding programmes and the variety Sharavathi can be used in hybridization programmes to increase the yield.

Conclusion

The current study revealed that there is greater scope for exploiting the variation present among the traditional varieties of Karnataka and Tamil Nadu. As the millets getting their place in the center of meals now a days, the development of high yielding, nutrient rich ragi is need of the hour. Trait targeted finger millet improvement programmes may be undertaken in future by utilizing the data generated from this experiment.

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