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Evaluation of fingermillet (*Eleusine coracana* L.) genotypes for growth, yield and yield attributing traits in Vindhya region of Uttar Pradesh

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Abstract

The field experiment entitled Evaluation of Finger millet ((*Eleusine coracana* L.) genotypes for growth, yield and yield Attributing traits in Vindhya region of Uttar Pradesh was conducted during kharif 2023 at field experimentation center, Departement of genetics and plant Breeding. SHUATS, Prayagraj, (U.P). The experiment was laid out in Randomized Block Desgin with eleven genotypes which were replicated thrice. The genotypes are as follows, IE-177, IE-183, IE-184, IE-185, IE-186, IE-196, IE-189, IE-203, FIN-7669 respectively. From the present study , it is concluded that among the 11 genotypes of Finger Millet, IE - 184 (14.30 gms), followed by IE - 185 (14.23 gms), IE - 184 (29.51 gms), and IE - 185 (29.40 gms), recorded the highest seed yield per plant, seed yield per hectare. High GCV and PCV were recorded for the traits, Test weight, Seed yield per plant, Seed yield per plot, seed yield per hectare, plant height at 30 DAS. High heritability, coupled with genetic advance as a percent of the mean, was observed for the Test weight, Seed yield per plant, seed yield per plot, seed yield per hectare, plant height at 30 DAS. These genotypes are recommended for hybridization programs using will further improve crop performance and increase Finger Millet yield in the Vindhya region of Uttar Pradesh.

Key words: Finger millet, genotypic coefficient of variation, phenotypic coefficient of variation, heritability, genetic advance, growth, yield, vindhya region and Uttar Pradesh

Introduction

Finger millet (*Eleusine coracana* L.), a millet crop in the Poaceae family, is widely cultivated in arid and semi-arid regions of Africa and Asia, particularly in countries like India, Uganda, Ethiopia, (Odeny *et al.*, 2013). Cultivated finger millet is cross compatiable with the wild subspecies Africana and with another allotetraploid, E.kigeziensis (2n=4x =38). These two wild allotetraploids are confined to the African continent with E. kigeziensis being endemic to southwestern Uganda and Rwanda (Dida and Devos *et al.*, 2006).

In many rural areas, finger millet has been a stape food,providing sustenance and nutrition to the local populations (Shetty and Hittalmani, *et al.*, 2014).

Traditional dishes made from finger millet,such as ragi mudha, ragi roti, ragi, malt are part of the culinary heritage of many Indain communities (Zaveri and Gudigar *et al.*, 2016).

They noticed that early maturity and drought tolerance are crucial for enhancing yield stability in semi –arid regions (Yadav *et al.*, 2010).

They laid the foundation for understanding

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how these traits influence productivity used these traits influence productivity & used to bred high –yielding, stress resilient finger millet varieties for both local consumption and commercial production (Yadav *et al.,* 2010 and Hedgde *et al.* 2015 and Ravi *et al.,* 2019).

Based on the key points discussed, the current research titled *"Evaluation of Finger Millet (Eleusine coracana L.) Genotypes for Growth, Yield, and Yield Attributing Traits in the Vindhya Region of Uttar Pradesh"* aims to identify high-yielding genotypes of finger millet. The objectives of the study are: (1) To evaluate the yield potential among 11 Finger Millet genotypes. To assess the adaptability among Finger millet genotypes. To estimate the genetic variability among Finger millet genotypes

Materials and Methods

The present experiment were carried out in the field experimentation center of Department of genetics and plant breeding ,Naini Agriculture institution, Sam Higginbottom university of agriculture technology and science during *kharif* 2023-2024 in randomized block design .

Observation recorded

Experiment was carried out in 11 Finger millet genotypes on Evalution, Growth and yield & yield attributing parameters. The data recorded for 16 Characters viz., field emergence, plant height @30,60,90 DAS, days to 50 flowering, days to maturity, number of productive tillers, number of fingers per ear, ear head length, ear head width, seed yield per plant, seed yield pr plot,seed yield per hectare, biological yield per plant, harvest index, test weight

Experimental material

In experimental material includes 11 genotypes with one control. IE-177, IE-183, IE-185, IE-186, IE-190, IE-195, IE-196, IE-189, IE-203, FIN-7669.

Results and Discussion

Field emergence: Ranged from 72.00% (IE-196) to 84.67% (IE-184), with a mean of 2.47%. Plant height at @ 30 days : Ranged from 18.13% (IE-196) to 31.10%(IE-31.10) with a mean of 1.39 %. Plant height at @ 60 days : Ranged from 47.93% (IE-196) to 60.57 % (IE-184), with a mean of 1.34 %. Plant height at @ 90 days : Ranged from 102.47 cm (IE-184) to 93.37 cm (IE-93.37), with a mean of 1.45 cm. Days to 50% flowering : Ranged from 74.43(IE-196) cm to 62.93 cm (IE-184), with a mean of 1.23cm. Days to maturity : Ranged from 103.24

Table 1.1. Analysis of variance on Evaluation of Finger millet *(Elusine coracana*L*)* genotypes for growth, yield and yield attributing traits in Vindhya region in Uttar Pradesh..

S. No.	Source of Variation / Degree of freedom	Mean Sum of Squares		
		Genotypes 2	Replication 10	Error 20
1	Field Emergence (%)	65.19**	4.94	18.31
2	Plant Height at 30 DAS (cm)	56.50**	1.86	5.77
3	Plant Height at 60 DAS (cm)	62.41**	8.65	5.36
4	Plant Height at 90 DAS	23.16**	3.78	6.33
5	Days to 50% Flowering	57.51**	10.48	4.54
6	Days to Maturity	46.41**	2.22	1.36
7	Number of Prodcutive Tillers	1.33**	0.03	0.07
9	Number of Fingers per Ear	1.06**	0.07	0.22
10	Ear Head Length (cm)	14.63**	0.44	1.10
11	Ear Head Width (cm)	0.40**	0.17	0.10
12	Seed yield per plant (gm)	13.56**	1.20	1.69
13	Seed yield per plot(gm)	16608.85**	1467.03	2069.32
14	Seed yield per Hectare (kg/t)	58.03**	9.51	7.36
15	Biological yield per plant (gm)	142.32**	1.09	3.04
16	Harvest Index (%)	89.16**	0.98	2.51
17	Test weight (gm)	0.75**	0.06	0.03

*Significance at 5%; **Significance at 1%

cm (IE-196) to 91.64 cm (IE-184), with a mean of 0.67cm. **Number of productive tillers** : Ranged from 8.67 tillers/hill (IE-184) to 6.70 tillers /hill 6.70 cm (IE-196) cm with a mean of 0.15 tillers /hill. **Number of fingers per ear** : Ranged from 7.05 cm (IE-184) to 6.70 cm (IE-196)with a mean 0.27cm. **Ear head length**: Ranged from 16.60cm (IE-184) to 10.27cm (IBT-41), with a mean of 0.60 cm. **Ear head width** : Ranged from 3.72cm (IE-184) to 26.0 cm (IE-196) with a mean of 0.18 cm. **Seed yield per plant** : Ranged from 14.30 (IE-184) to 7.90 (IE-196) gm with a mean 0.75gm. **Seed yield per plot** : Ranged from 276.50 gm(IE-196) to 500.50gm with a mean 26.26 gm: **Seed yield per hectare** Ranged from 29.51 gm (IE-184) to 16.31 (IE-196), with a mean of 1.57gm. **Biolgical yield per plant** : Ranged from 35.33 gm(IE-196) to 54.83(IE-184) gm with a mean of 1.01gm. **Harvest index**: Maximum of 30.67 gm (IE-196), minimum of 46.33 gm (IE-184). **Test Weight**: Ranged from 3.60 gm(IE-184) to 1.89 gm, with a mean of 0.10 gm.

Phenotypic and genotypic coefficient of variation

The high estimates of both phenotypic coefficient of variation (PCV) and genotypic coefficient of variation (GCV) for traits such as seed yield per hectare, Seed yield per plot, test weight, plant height at @30 days. Similarly, (Singh and Yadava-2005) found high values of phenotypic and genotypic coefficients of variation for, seed yield per plant, seed yield per hectare, biological yield per plant, number of productive tillers found them to be genetically diverse, providing good opportunities for genetic improvement.

Hertabilty

In present research high herita-

Table 1.2. Mean performance of 16 quantitative traits among 11 Finger Millet genotypes evaluated during *Kharif*-2023

Genotypes	Field emergence (%)	PH 30 DAS (cm)	PH 60 DAS (cm)	PH 90 DAS (cm)	Days to 50% flowering	Days to maturity	Number of productive tillers	Number of fingers per ear	Ear head length (cm)	Ear head width (cm)	Seed yield per plant (g/plant)	Seed yield per plot (g/plot)	Seed yield per hectare (q/ha)	Biological yield per plant (g)	Harvest index (%)	Test weight (g)
IE -177	79.00	25.03	55.07	97.73	69.30	97.83	8.20	5.92	12.93	3.08	11.97	418.83	24.68	48.33	38.83	2.77
IE -183	83.00	29.07	58.07	99.20	64.73	95.31	8.47	6.22	15.43	3.32	14.00	490.00	28.91	52.67	43.67	3.17
IE -184	84.67	31.10	60.57	102.47	62.93	91.64	8.67	7.05	16.60	3.72	14.30	500.50	29.51	54.83	46.33	3.60
IE -185	83.67	30.34	60.07	100.53	64.07	93.59	8.50	6.50	16.00	3.47	14.23	498.17	29.40	54.00	45.33	3.33
IE -186	81.00	26.00	56.13	99.47	66.27	97.15	8.30	6.02	14.23	3.20	12.27	429.33	25.35	49.17	37.33	2.93
IE -190	77.67	24.40	54.20	97.07	71.40	98.18	8.10	5.85	12.27	3.22	11.27	394.33	23.28	43.33	35.00	2.83
IE -195	82.33	27.20	57.00	98.07	64.73	97.10	7.93	6.10	15.17	3.27	12.90	451.50	26.67	50.00	41.33	3.00
IE -196	72.00	18.13	47.93	93.37	74.73	103.24	6.70	4.88	10.27	2.60	7.90	276.50	16.31	35.33	30.67	1.89
IE -189	74.67	23.30	52.00	96.07	72.27	101.85	7.60	5.68	11.97	2.85	11.00	385.00	22.75	41.33	35.33	2.52
IE -203	73.00	19.40	48.00	94.07	73.50	102.67	7.23	5.22	11.00	2.62	9.87	345.33	20.39	36.67	31.83	2.20
FIN-7669 Check	73.67	20.70	49.33	95.23	73.17	102.79	6.94	5.52	11.23	2.68	9.17	320.83	18.85	40.83	33.33	2.47
Grand	2594.00	824.02	1795.10	3219.80	2271.30	3244.08	259.92	194.85	441.30	102.05	386.60	13531.00	798.26	1519.50	1257.00	92.13
SE(m)	2.47	1.39	1.34	1.45	1.23	0.67	0.15	0.27	0.60	0.18	0.75	26.26	1.57	1.01	0.91	0.10
SE(d)	3.49	1.96	1.89	2.05	1.74	0.95	0.22	0.38	0.85	0.25	1.06	37.14	2.22	1.42	1.29	0.14
Critical Difference	7.12	4.00	3.85	4.18	3.54	1.94	0.44	0.78	1.74	0.52	2.16	75.66	4.51	2.90	2.64	0.28
Root MSE	4.28	2.40	2.31	2.52	2.13	1.17	0.27	0.47	1.05	0.31	1.30	45.49	2.71	1.74	1.58	0.17
Grand Mean	78.61	24.97	54.40	97.57	68.83	98.31	7.88	5.90	13.37	3.09	11.72	410.03	24.19	46.05	38.09	2.79
Coefficient variation	5.44	9.62	4.26	2.58	3.10	1.19	3.39	7.92	7.83	10.08	11.09	11.09	11.22	3.79	4.16	6.12
R Sqaure	0.64	0.83	0.86	0.65	0.87	0.95	0.90	0.71	0.87	0.69	0.80	0.80	0.80	0.96	0.95	0.93

bility were for almost every character and it ranged from 1.6 % to 99.9 %. High heritability (>60%) were recorded for Biological yield per plant (99.9%). The high heritability values observed for the traits respond well to selection and are less influenced by environmental conditions, making them ideal targets for breeding programs. Thus, while high heritability increases the effectiveness of selection, breeders also need to manage environmental conditions to fully realize the

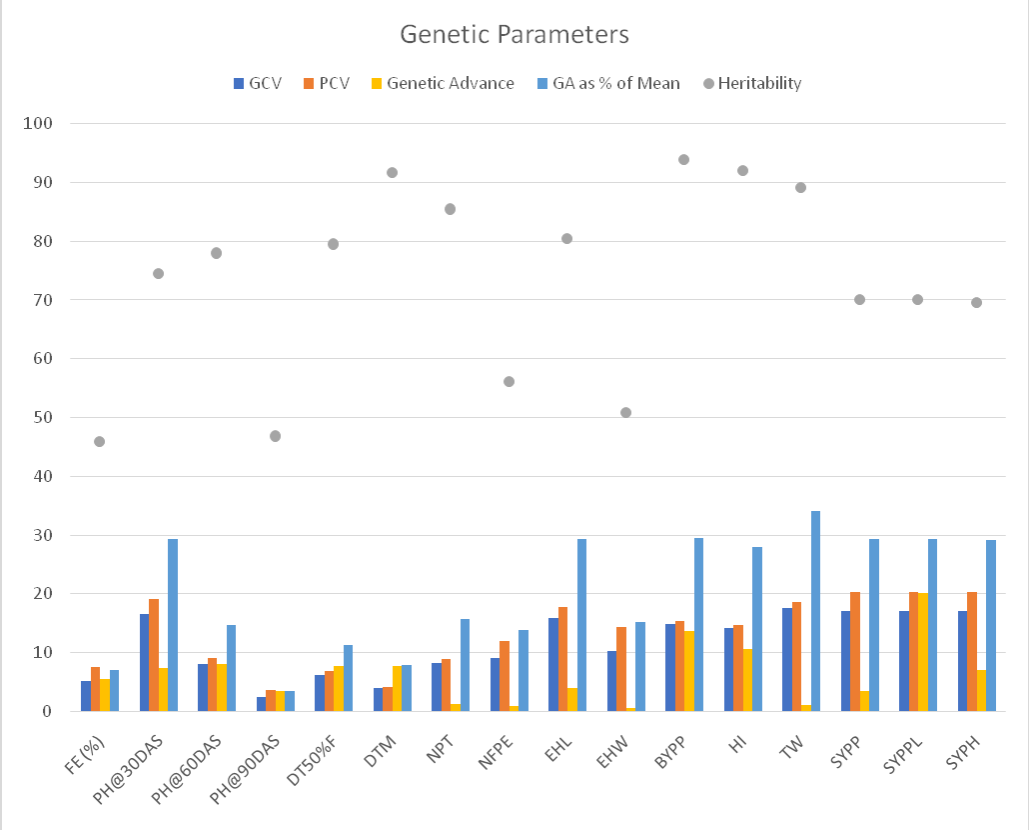

Fig. 1.4. Bar diagram depicting GCV, PCV, heritability and genetic advance for 16 quantitative characters of Finger Millet.

Table 1.3. Genetic parameters for 16 quantitative traits in Finger Millet genotypes

Trait	GCV	PCV	Heritability	Genetic Advance	GA as % of Mean
FE (%)	5.029	7.4107	46.05	5.5263	7.0304
PH@30DAS	16.4682	19.0739	74.54	7.3138	29.2899
PH@60DAS	8.0169	9.0764	78.02	7.9348	14.5868
PH@90DAS	2.4275	3.5417	46.98	3.3441	3.4274
DT50%F	6.1051	6.8451	79.55	7.7201	11.2166
DTM	3.9421	4.1167	91.7	7.6446	7.7764
NPT	8.2397	8.911	85.5	1.2362	15.695
NFPE	8.969	11.9649	56.19	0.8178	13.8499
EHL	15.8842	17.7073	80.47	3.9252	29.3523
EHW	10.2707	14.388	50.96	0.4671	15.1032
BYPP	14.7976	15.2746	93.85	13.5978	29.5313
HI	14.1088	14.7093	92	10.6189	27.8778
TW	17.5269	18.5641	89.14	0.9517	34.0882
SYPP	16.9785	20.2818	70.08	3.4301	29.2791
SYPPL	16.9785	20.2818	70.08	120.0533	29.2791
SYPH	16.9892	20.3577	69.64	7.065	29.2067

genetic potential of these traits.

Genetic advance

The highest genetic advance was recorded for Seed yield per plot (120.05), biological yield per plant (13.598), Harvest Index (10.619), Plant height at 60DAS (7.935), Days to 50 % flowering (7.720) Days to maturity (7.645), Plant height at 30DAS (7.314), Seed yield per hectare (7.065), Field emergence (5.526), Ear head length (3.925), Seed yield per plant (3.430), Plant height at 90DAS (3.344), Number of productive tillers (1.236), number of fingers per ear (0.818), Ear head width ((0.467)

Genetic advance as per mean

Genetic advance mean ranges from seed yield per plot (12.0533) to ear head width (0.4671). whereas, the high genetic advance mean for test weight , biological yield per plant, ear head length, plant height at 30 DAS. Seed yield per plant, seed yield per plot. The moderate genetic advance mean (10-20%) was found in ear head width followed by number of productive tillers, ear head length plant height at 60 Days. And low genetic advance mean Days to 50% flowering, Days to maturity, plant height at 90 DAS. High heritability alone is insufficient for achieving significant improvement through selection in advanced generations unless it is accompanied by a substantial amount of genetic advance. Heritability serves as an indicator to predict the expected outcomes of traits during the selection process.

Discussion

The study in the Prayagraj region under timely sowing conditions evaluated eleven finger millet genotypes, revealing significant variations in seed yield per plot and other. **PCV and GCV**: Phenotypic coefficient of variance (PCV) consistently exceeded genotypic coefficient of variance (GCV) for all traits, suggesting significant environmental influence. The highest PCV and GCV were observed for the seed yield per plot, seed yield per hectare & plant height at @ 30 days. Heritability and Genetic Advance: These estimates are crucial for guiding selection practices. Traits like seed yield per plant, ear head length ,harvest index showed considerable variation.

Conclusion

In conclusion, this study offers a detailed evalution of 11 fingermillet genotypes, highlighting significant performance variations across different genotypic categories. Among the 11 finger millet genotypes, IE-195, IE-189, and IE- 203 stood out for their exceptional growth and seed yield, outperforming the check variety FIN-7669. These genotypes exhibited superior traits that make them highly suitable for cultivation. Given these results, it is recommended that the IE-186, IE- 190, and IE-203 be prioritized for commercial cultivation in the Prayagraj region of Uttar Pradesh due to their superior growth and yield characteristics. Additionally, traits with high genotypic coefficient of variation (GCV), phenotypic coefficient of variation (PCV), and heritability should be targeted for further hybridization and breeding programs.

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Conflict of interest

The authors have no competing interests

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