

Performance of Finger Millet Varieties under Agro - Climatic Conditions of Nagaland

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ABSTRACT

A field experiment was carried out at SASRD, Nagaland University during August to December 2019 to study the performance of ten finger millet varieties under rainfed conditions. The experiment was conducted in Randomized Block Design with three replications. The treatments consisted of ten varieties viz., VR - 847, OEB 532, OEB 526, GPU 66, GPU 67, VL 149, VL 347, VL 352, VL 376 and OUAT 2. The results revealed that higher plant height were recorded by the variety OUAT at 30 DAS (49.14 cm), 60 DAS (89.37 cm), 90 DAS (99.82 cm) and at harvest (96.00 cm) and this was at par with VR 84 and GPU 66. Early flowering and early maturity was recorded with the variety V₂ - OEB 532. Highest number of productive tillers hill⁻¹ (4.52) and more number of ear heads hill⁻¹ (7.48) were obtained with the variety VL 352. Yield attributes including number of fingers ear head⁻¹ were obtained with the variety VL 352 (7.80 fingers ear head⁻¹). Whereas, higher finger length (9.53 cm), more number of seeds panicle⁻¹ (2536.35 seeds panicle⁻¹) and higher test weight (3.68 gm) were obtained with the variety GPU 66. Among the ten varieties highest grain yield (2937 kg ha⁻¹) and harvest index (30.92 %) were also recorded with the variety GPU 66. Whereas, highest straw yield (9833 kg ha⁻¹) was recorded with the variety VR 847.

Keywords: Performance of finger millet, Varieties, Yield attributes

FINGER millet [*Eleusine coracana* (L.) Gaertn] belonging to the family gramineae or poaceae is the 3rd most important crop among the millets after pearl millet and sorghum. Finger millet is considered as important crop for food and nutritional security. In many hilly and tribal areas of India, finger millet is still considered as staple food. Finger millet is a hardy crop with minimum disease and pest problems and assures reasonable economic returns even under adverse growing conditions. Finger millet grains contain ash (3.9 %), protein (19.2 %), minerals (2.24 %), fat (1.29 %), carbohydrates (76.32 %) and besides the grains also contains vitamin A and B. Finger millet grains are rich in methionine (amino acid), potassium phosphorous and calcium (410 mg 100 g⁻¹ grains) (Tomar *et al.*, 2011). Finger millet grains contain two times more phosphorous, four times more minerals and 10 times more calcium than rice and wheat (Stanly and Shanmugam, 2013).

Finger millet is native to the Ethiopian highlands of Central Africa and was introduced into Indian

subcontinent approximately 3000 years ago. The long history of cultivation of finger millet in India under diverse agro-climatic conditions and the associated human and natural selection has resulted in generation of large variability giving India the status of secondary centre of diversity. Studies indicate that finger millet originated from its nearest wild relative *Eleusine africana* through selection and domestication. In India finger millet is grown in an area of about 1.14 m ha with the production of 1.82 mt with a productivity of 1601 kg ha⁻¹ (Anonymous, 2018). In Nagaland finger millet is grown in an area of about 300 ha with the production of 310 tones and productivity of 970 kg ha⁻¹ (Anonymous, 2018). Though there has been a declining trend in area, scope exists to improve the yield by 30 to 50 per cent through adoption of suitable varieties and improved technology. Therefore, an attempt was made to study the performance of different finger millet varieties under rainfed conditions of Nagaland.

MATERIALS AND METHODS

A field experiment was carried out at Agronomy farm, SASRD, Nagaland University during August to December 2019 to study the performance of finger millet under the agro-climatic conditions of Nagaland. The experiment was conducted in Randomized Block Design with three replications. The treatments consisted of ten varieties *viz.*, VR - 847, OEB 532, OEB 526, GPU 66, GPU 67, VL 149, VL 347, VL 352, VL 376 and OUAT 2. The soil of the experimental field was sandy loam. The initial soil status of the experimental field had pH 4.6, Organic carbon 1.06 per cent, available nitrogen 222.8 kg ha⁻¹, available phosphorous 19.86 kg ha⁻¹ and available potassium 217.26 kg ha⁻¹. The experimental site falls under tropical sub-humid climate with relatively high humidity, moderate to high rainfall and moderate temperature. The average temperature of the region during summer ranges between 21°C to 30°C. Due to high relative humidity during winter temperature rarely goes below 8°C. Annually, the rainfall of the region varies between 2000-2500 mm. The crop was sown during the month of August and harvested during the month of December. The crop was sown with a seed rate of 10 kg ha⁻¹ with a spacing of 30 cm x 10 cm. The application of fertilizers was done with a blanket recommendation of 40 : 20 : 20 N, P₂O₅ and K₂O kg ha⁻¹. Observations on plant height, days to 50 per cent flowering, days to maturity, no of productive tillers hill⁻¹, number of ear heads hill⁻¹, yield attributes, grain yield, straw yield and harvest index were recorded at the appropriate growth stages of finger millet.

RESULTS AND DISCUSSION

Different varieties exerted significant influence on plant height of finger millet. Among ten varieties OUAT 2 attained highest plant height at 30 DAS (49.14 cm), 60 DAS (89.37 cm), 90 DAS (99.82 cm) and at harvest (96.00 cm) and this was at par with VR 84 and GPU 66. Long and medium duration finger millet varieties were evaluated for higher growth and yield in Coimbatore region. It has been observed that the plant height of finger millet was increased up to 90 DAS, in the time period between 30 to 60 DAS increase in plant height was rapid. Generally, as

compared to 90 DAS the plant height was slightly decreased at harvest. Similar line of work was reported by Kajur *et al.* (2018).

Among the yield attributes all the yield attributes except number of fingers ear head⁻¹ had significantly influenced by different varieties of finger millet (Table 1). Higher number of fingers ear head⁻¹ were recorded with the variety VL 352 (7.80). Whereas, lengthier fingers (9.53 cm), higher number of seeds panicle⁻¹ (2524.25) and more test weight (3.68 gm) were obtained with the variety GPU 66.

TABLE 1

Plant height (cm) of different finger millet cultivars at 30, 60, 90 DAS and at harvest

Variety	30 DAS	60 DAS	90 DAS	At harvest
V ₁ - VR 847	46.5	85.2	96.7	92.1
V ₂ - OEB 532	38.1	66.6	80.0	75.7
V ₃ - OEB 526	35.4	62.0	76.3	71.9
V ₄ - GPU 66	44.9	81.6	93.1	90.0
V ₅ - GPU 67	33.1	58.0	72.7	70.1
V ₆ - VL 149	40.6	77.4	86.7	82.0
V ₇ - VL 347	43.8	77.5	91.0	88.8
V ₈ - VL 352	34.2	61.7	72.9	68.7
V ₉ - VL 376	39.4	68.4	79.7	76.0
V ₁₀ - OUAT 2	49.1	89.3	99.8	96.0
SEM±	1.74	3.39	3.68	3.66
CD (P=0.05)	5.17	10.08	10.92	10.88

Early flowering and early maturity was recorded with the variety V₂ - OEB 532 and these were at par with variety V₆ - VL 149 (Table 2). A range of high variability in days to 50 per cent flowering is desirable for selecting the genotypes for earliness. Variability in days to 50 per cent flowering has also been reported by Kadar *et al.* (2013) from 72 days to 102 days, Suryanarayana *et al.* (2014) from 77 days to 98.3 days and Bishit *et al.* (2015) from 54.5 days to 90.9 days. Variation in days to maturity might be due to their different genetic constitution. A difference in days to maturity has also been reported by Ganapathy *et al.* (2011) from 95 days to 135 days and Haradari *et al.* (2011) from 84 to 128 days.

TABLE 2

Days to 50 per cent flowering, days to maturity, number of productive tillers hill⁻¹ and number of ear heads hill⁻¹ of different finger millet cultivars

Variety	Days to 50 % flowering	Days to maturity	No of Productive tillers hill ⁻¹	No of ear heads hill ⁻¹
V ₁ - VR 847	69	102	2.73	6.85
V ₂ - OEB 532	65	100	4.37	5.14
V ₃ - OEB 526	89	103	1.52	6.58
V ₄ - GPU 66	66	117	3.43	5.48
V ₅ - GPU 67	68	103	2.37	7.23
V ₆ - VL 149	65	103	4.32	5.67
V ₇ - VL 347	87	106	1.68	6.71
V ₈ - VL 352	71	116	4.52	7.48
V ₉ - VL 376	71	112	3.05	6.07
V ₁₀ - OUAT 2	68	112	3.36	5.10
SEm±	2.11	102.71	0.20	0.08
CD(P=0.05)	6.28	100.72	0.58	0.24

Highest number of productive tillers hill⁻¹ (4.52) and more number of ear heads hill⁻¹ (7.48) were obtained with the variety V₈ - VL 352 (Table 2). Extent in variability in productive tillers hill⁻¹ might be resulted due to different genetic makeup of the genotypes and also various area of adaptation coupled with environmental interaction. Similarly significant variability in number of productive tillers hill⁻¹ has also been reported by Ganapathy *et al.* (2011) from 3.00 to 10.00, Haradari *et al.* (2011) from 4.1 to 8.4, Ali *et al.* (2013) from 3.7 to 8.44, Kadar *et al.* (2013) from 4.30 to 9.90, Suryanarayana *et al.* (2014) from 3.60 to 8.67, Manjunath *et al.* (2013) from 3.59 to 10.83 and Bishit *et al.* (2015) from 3.33 to 8.63 in finger millet.

Dhami *et al.* (2018) studied the genetic diversity among 16 finger millet genotypes on the basis of eight agro - morphological traits and they observed variation in traits among genotypes. Substantial variation in growth and yield attributes in finger millet cultivars were also reported by other authors.

Biological yield and harvest index was greatly influenced by different varieties of finger millet. Among

TABLE 3

Yield attributes of different finger millet cultivars

Variety	Number of fingers earhead ⁻¹	Finger length (cm)	Number of seeds panicle ⁻¹	Test weight (cm)
V ₁ - VR 847	6.86	7.73	2533	3.50
V ₂ - OEB 532	7.05	8.03	2524	2.47
V ₃ - OEB 526	6.03	7.96	2495	2.57
V ₄ - GPU 66	7.51	9.53	2536	3.68
V ₅ - GPU 67	7.24	8.17	2163	3.22
V ₆ - VL 149	7.03	8.40	2436	2.53
V ₇ - VL 347	7.13	8.90	1137	2.73
V ₈ - VL 352	7.80	8.47	1461	3.62
V ₉ - VL 376	7.11	7.40	1566	3.54
V ₁₀ - OUAT 2	6.63	8.37	1521	2.12
SEm±	0.39	0.34	168.94	0.11
CD (P=0.05)	NS	1.02	501.95	0.33

them highest grain yield (2937.17 kg ha⁻¹) was recorded by the variety GPU 66. Higher straw yield (9833 kg ha⁻¹) was recorded with the variety VR 847 (Table 4). Harvest index was also significantly influenced by different varieties of finger millet. Among ten varieties higher harvest index (30.92 %) were recorded with the variety GPU 66 which was at par with OEB 526 (29.56 %) and VL 352 (29.26 %). Studied the large

TABLE 4

Grain yield (kg ha⁻¹), straw yield (kg ha⁻¹) and harvest Index (%) of different finger millet cultivars

Variety	Grain yield (kg ha ⁻¹)	Straw yield (kg ha ⁻¹)	Harvest Index (%)
V ₁ - VR 847	1849	9833	15
V ₂ - OEB 532	791	4833	14
V ₃ - OEB 526	1590	3796	29
V ₄ - GPU 66	2937	6559	30
V ₅ - GPU 67	2645	9500	21
V ₆ - VL 149	1428	4314	24
V ₇ - VL 347	1129	3277	25
V ₈ - VL 352	1388	3351	29
V ₉ - VL 376	711	2425	22
V ₁₀ - OUAT 2	994	3177	23
SEm±	53.85	161.17	1.11
CD (P=0.05)	159.99	478.86	3.29

number of finger millet cultivars in terms of their yield performance as well as agro morphological characteristics were greatly varied. Reported amount of variability in finger millet genotypes for yield attributes over three years.

Ouat 2 attained highest plant height at all the stages. Higher number of fingers ear head⁻¹ were recorded with the variety VL 352 (7.80). Whereas, lengthier fingers (9.53 cm), higher number of seeds panicle⁻¹ (2524.25) and more test weight (3.68 gm) were obtained with the variety GPU 66. Early flowering and early maturity had recorded with the variety V₂ - OEB 532. Highest grain yield (2937.17 kg ha⁻¹) were recorded by the variety GPU 66. Higher straw yield (9833 kg ha⁻¹) was recorded with the variety VR 847. It is observed that variation in growth and yield attributes might be due to their different genetic constitution.

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