



# Plant Archives

Journal homepage: <http://www.plantarchives.org>

DOI Url : <https://doi.org/10.51470/PLANTARCHIVES.2024.v24.no.2.305>

## VARIETAL ASSESSMENT OF LOCAL LANDRACES OF FOXTAIL MILLET (*SETARIA ITALICA*) IN TIRAP DISTRICT OF ARUNACHAL PRADESH, INDIA

Abhimanyu Chaturvedi<sup>1\*</sup>, S.K. Chaturvedi<sup>2</sup> and Ajeet Pratap Singh<sup>3</sup>

<sup>1</sup>Krishi Vigyan Kendra, Tirap District- Deomali, Arunachal Pradesh India.

<sup>2</sup>KVK Lower Dibang Valley - Balek, Arunachal Pradesh, India.

<sup>3</sup>S.D.J.P.G College, Chandeshwar, Azamgarh, Uttar Pradesh, India.

\*Corresponding author Email: [mannuhorti@gmail.com](mailto:mannuhorti@gmail.com)

(Date of Receiving-25-03-2024; Date of Acceptance-16-06-2024)

### ABSTRACT

Foxtail millet (*Setaria italica*) is a member of millet family and this is grown in Tirap, Changlang, Longding, Sinag, Shaomi and other districts of Arunachal Pradesh, some parts of Uttarakhand, Bihar, Telangana, Karnataka and other states of India. This is a hardy crop and considered as one of the potential crops for future food security; in respect to climate change. Three accessions of foxtail millet were evaluated on the different morphological characteristics. Foxtail landraces from Tirap district of Arunachal Pradesh were evaluated at farm of Krishi Vigyan Kendra- Tirap during 2022. The plot size was 1m<sup>2</sup> and there were three samples. Days to heading and days to maturity varied from 29-54 and 57 to 85 days after germination respectively. Similarly, flag leaf length/ breadth ratio, flag leaf sheath length, ligule length, peduncle length and plant height varied from 3.21- 9.26, 6.24 -8.81 cm, 0.09 -0.18 mm, 9-21.28 cm, 2.48-12.47 cm and 98.46 – 109.81 cm, respectively.

**Key words:** Arunachal Pradesh, land races, Foxtail millet, Agro-morphological,

### Introduction

Foxtail Millet (*Setaria italica*), one of the oldest of the cultivated millets in the world, is cultivated in about 23 countries in Asia, Africa and America (Austin, 2006). It is a self- pollinating, short duration, C<sub>4</sub> cereal, good as food for human consumption, feed for poultry and cage birds, and fodder for cattle (Hariprasanna, 2023). Foxtail millet ranks second among the millets production in the world and continues to have an important place in the world agriculture providing food to millions of people dependent on poor or marginal soils in southern European and in temperate, subtropical and tropical Asia. In India, it is grown mainly in Andhra Pradesh, Karnataka, Telangana, Rajasthan, Maharashtra, Tamil Nadu, Madhya Pradesh, and Uttar Pradesh. In North Eastern region foxtail millet is mainly grown in East Siang, Siang, Upper Siang, Lower Dibang Valley, Tirap, Longding, Changlang, Namsai, Shiyomi districts of Arunachal Pradesh and West Garo Hills of Meghalaya. The total area in India is 0.8

lakh ha and production around 0.6 lakh tonnes (Hariprasanna, 2023). The total area of millets in Arunachal Pradesh is 26.70 ha, production 27,460 MT and yield 10.25 q/ha (Source: APEDA e-catalogue for Export of millets and Value-added Products – NORTH EASTERN States, 2023). The area under foxtail millet in India has come down by more than half during 1990'. It's mainly due to introduction of more profitable crops like sunflower and soybean in black soils.

### Nutritional importance and health benefits

It is used as an energy source for pregnant and lactating women and for sick people and children. Of late, the importance of foxtail millet is recognized as diabetic food. It is rich in dietary fiber, minerals, micronutrients, protein, and has low glycemic index (GI). Unlike rice, foxtail millet releases glucose steadily without affecting the metabolism of the body. The incidence of diabetes is found to be rare among the population consuming foxtail millet diet.

**Table 1:** Nutritive comparison in between Foxtail millet vs Wheat vs Rice.

Components	Foxtail millet	Wheat (whole)	Rice
Carbohydrate (g)	60.9	71.2	78.2
Protein (g)	12.3	11.8	6.8
Fat (g)	4.3	1.5	0.5
Energy	331	346	345
Crude Fibre (g)	8	1.2	0.2
Mineral matter (g)	3.3	1.5	0.6
Amylose (%)	17.5	25	12-19
Amylopectin (%)	82.5	75	88-81
Ca (mg)	31	41	10
P (mg)	290	306	160
Fe (mg)	2.8	5.3	0.7
Zn (mg)	2.4	2.7	1.4
Mg (mg)	81	138	90
Na (mg)	4.6	17.1	-
K (mg)	250	284	-
Cu (mg)	1.4	0.68	0.14

Source: Hariprassanna (2023)

It offers a tremendous deal of promise for food security. Crop hardiness has a greater potential to mitigate the consequences of climate change. Consequently, the discovery, assessment, and commercial production of foxtail millet require significant attention. The best

**Table 2:** Major cultivation practices.

Operation	Practice
Land preparation	Plough once with mold board plough before onset of monsoon, harrow or plough twice with local plough with the onset of monsoon, make the field smooth and well levelled
Time of sowing	July- August: Karnataka, July- Tamil Nadu and Andhra Pradesh, 2 <sup>nd</sup> - 3 <sup>rd</sup> week of July- Maharashtra 1 <sup>st</sup> week – 3 <sup>rd</sup> week of March – Arunachal Pradesh
Seed rate	8 kg / ha
Spacing and optimum plant population	25-30 cm (row to row), 10 cm (plant to plant), 4 – 4.5 lakh/ha
Seed treatment	Fungicides – Ridomil MZ- 78 @ 2g / kg seed, Carbendazim – 2 gm / kg seed Biofertilizer- Aspergillus @ 25 gm / kg seed
Manures and fertilizers (for rainfed crops)	FYM: 5- 7.5 t/ha Urea: 52 kg /ha DAP: 33 kg /ha
Inter cultivation	Manual weeding required during 30-35 days old crop
Irrigation/drainage	2-3 irrigation in summer; based on type of soil and climatic conditions. Drainage is important to avoid water logging; in case of heavy rainfall
Weed control	Isoproturan – Pre-emergence (0.5 kg a.i. /ha), 2-4 D- Post emergence (0.75 kg a.i./ha, 15-20 DAS)
Disease control	Rogue out downy mildew affected plants, spray mancozeb @ 2 gm/litre; if disease noticed
Pest control	1. Early sowing in month of May; wherever possible; 2. 1.5 time more seed in late sown crops; 3. Seed treatment with chloropyriphos @ 2ml/litre water /kg seed or Imidachloprid @ 0.7 ml/litre/kg seed
Harvesting	Harvest when ear heads are dry either by cutting the whole plant by sickle or the ears separately
Threshing	Thresh after drying for a few days with a stone roller or by trampling under the feet of bullocks
Inter – cropping	Foxtail millet: pigeon pea (5:1 ratio), foxtail millet: ground nut (2:1 ratio)

Source: Hariprassanna (2023)

strategy is to boost landraces for variability development.

## Material and Methods

Three accessions of foxtail millet were purpose fully selected for evaluation of the agro-morphological characteristics (Table 3). Foxtail landraces from Lazu, Khetibasti and Namsang were evaluated during 2022 at KVK farm, Deomali, Tirap district of Arunachal Pradesh in 1m<sup>2</sup> plots with three replications. District Tirap lies between the latitudes 26° 38' N and 27° 47' N and the longitudes 96° 16' E and 95° 40' E.

Plants are sown continuously with 20 cm row spacing during 1<sup>st</sup> week of March. Parameters were recorded on Flag leaf length/breadth ratio, Flag leaf sheath length (cm), Ligule Length (mm), No. of branches, No. of basal tillers, No. of effective tillers, Peduncle length, (cm), Plant Height, (cm), 1000 grain weight (g), Days to heading (50%) from date of germination, Days to flowering after germination, Days to maturity (50%) after germination, Growth Habit, Blade pubescence, Lodging, Senescence, Fruit color and Apiculus color. Characters were evaluated based on foxtail millet descriptor (IBPGR, 1985). The SPSS for windows were used for data analysis.

## Results and Discussion

It is clear from Table 4. That the maximum flag leaf length/breadth ratio (9.26) was recorded with Namsang

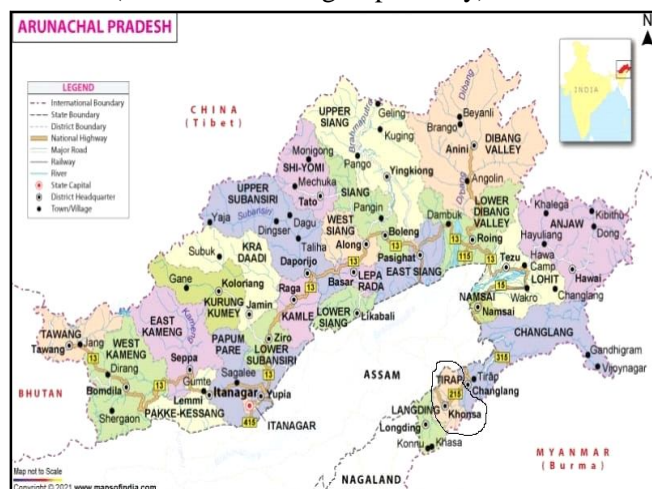
**Table 3:** Germplasm details of Foxtail millet from Tirap district of Arunachal Pradesh.

S.N.	Collection block	Altitude (meter)
1	Lazu	1498
2	Khetibasti	1236
3	Namsang	978

followed by Khetibasti (8.02) while the lowest ratio (3.21) was performed by Lazu accession. Similarly, the maximum flag leaf sheath length (8.81 cm) recorded with Namsang flowed by Lazu (8.19 cm) while minimum length recorded with Khetibasti (6.24 cm).

Khetibasti accession recorded maximum number of effective tillers (1.52) followed by Namsang (0.86) while minimum yielded by Lazu (0.78). These findings are supported by the research work of Nakayama *et al.*, (1999).

The peduncle length and grain weight resulted having positive correlation among each other. Namsang was recorded maximum peduncle length (12.47 cm) & eight of thousand grains (2.06 g) followed by Khetibasti landrace (8.21 cm and 1.48 g respectively) while the Lazu



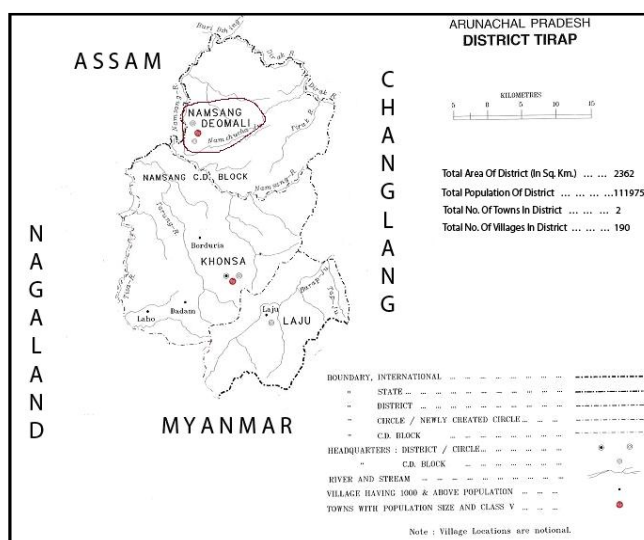
**Fig. 1:** Map of the State and Study area District in circle.

**Table 4:** The differences in characteristics of foxtail millet germplasm.

Name of accession	Flag leaf length/breadth ratio	Flag leaf sheath length (cm)	Ligule Length (mm)	No. of branches	No. of basal tillers	No. of effective tillers	Peduncle length (cm)	Plant Height (cm)	1000 grain weight (g)
Lazu	3.21	8.19	0.18	0.28	1.56	0.78	2.48	98.46	1.07
Khetibasti	8.02	6.24	0.12	0.98	1.62	1.52	8.21	103.32	1.48
Namsang	9.26	8.81	0.09	0.10	1.02	0.86	12.47	109.81	2.06

**Table 5:** Variation in different characters of foxtail millet germplasm.

Name of accession	Days to heading (50%)	Days to flowering	Days to maturity (50%)	Growth Habit	Blade pubescence	Lodging	Senescence	Fruit color	Apiculus color
Lazu	54	59	85	1	4	1	7	Black	Black
Khetibasti	29	42	57	1	1	1	1	Brown	Brown
Namsang	47	54	74	2	1	3	1	Yellowish	Yellowish



**Fig. 2:** Geographical Map of Study area (Under circle) under Tirap district.

recorded minimum length of peduncle (2.48 cm) with minimum grain weight (0.98 g) too. The positive correlation between peduncle’s length and grain weight has reported by Nirmala kurmari and Vetriventhan (2010) and Channappagoudar *et al.*, (2008). Ochiai (1996) considered high tillering accessions as recently originated from their wild progenitors.

Reddy *et al.*, (2006) noted a similar kind of variation while examining 21 foxtail millet accessions at ICRISAT, India. The growth habit, lodging, senescence, blade pubescence, fruit color and apiculus color all displayed significant diversity amongst accessions. Every accession exhibited green leaves and lacked pigmentation on any portion of the plant (Table 4). Kawase, M (1982, 1984) elaborated positive type of phenol colouration in land races from Asia. Regarding flowering and maturity point of view, Khetibasti accession was the quickest (42 & 57 days respectively) followed by Namsang (54 & 74 days

respectively) whereas Lazu took the maximum days (59 & 85 respectively).

### Conclusion

The different land races of foxtail millet of Arunachal Pradesh showed variation in different agro- morphological characteristics. This variation may be used in further breeding programmes of foxtail millet for yield enhancement, development of drought tolerance etc.

### References

- APEDA e- catalogue for Export of millets and Value-added Products – NORTH EASTERN States, (2023).
- Austin, D.F. (2006). Fox-tail Millets (*Setaria*: Poaceae)-abandoned food in two hemispheres. *Economic Botany* **60**(2), 143-158.
- Channappagoudar, B.B., Hiremath S.M., Biradar N.R., Koti R.V. and Bharamagoudar T.D. (2008). Physiological Basis of Yield Variation in Foxtail Millet. *Karnataka Journal of Agricultural Science*, **20**(3), 481-486.
- IBPGR (International Board for Plant Genetic Resources) (1985). Descriptors for *Setaria italica* and *Spumila*. International Board for Plant Genetic Resources. Rome. 18.
- Kawase, M. and Sakamoto S. (1982). Geographical distribution and genetic analysis of phenol color reaction in foxtail millet, *Setaria italica* (L.) P. Beauv. *Theoretical Applied Genetics*, **63**, 117-119.
- Kawase, M. and Sakamoto S. (1984). Variation, geographical distribution and genetical analysis of esterase isozymes in foxtail millet, *Setaria italica* (L.) P. Beauv. *Theoretical and Applied Genetics*, **67**(6), 529-533.
- Hariprasanna, K. (2023). *Indian Farming*, **73**(01), 47-49.
- Nirmala Kumari, A. and Vetriventhan M. (2010). Characterization of fox tail millet germplasm collections for yield contributing traits. *Electronic Journal of Plant Breeding*, **1**(2), 140-147.
- Ochiai (1996). Variation in tillering and geographical distribution in foxtail millet (*Setaria italica* P. Beauv). *Breeding Science*, **46**, 143-148.
- Reddy, V.G., Upadhyaya H.D. and Gowda C.L.L. (2006). Characterization of World's Foxtail Millet Germplasm Collections for Morphological Traits. *SAT e Journal* (ejournal.icrisat.org), **2**(1), 107-109.