E-ISSN: 2618-0618
P-ISSN: 2618-060X

www.agronomyjournals.com
2024; SP-7(11): 29-32
Received: 26-08-2024
Accepted: 07-10-2024

SD Barad
M.Sc. (Agri) Student, Department of Agronomy, College of Agriculture, Latur, VNMKV, Parbhani, Maharashtra, India

PN Karanjikar
Professor and Head, Department of Agronomy, College of Agriculture, Latur, VNMKV, Parbhani, Maharashtra, India

AP Sabale
M.Sc. (Agri) Student Department of Agronomy, College of Agriculture, Latur, VNMKV, Parbhani, Maharashtra, India

Sneha SB
M.Sc. (Agri) Student, Department of Agronomy, College of Agriculture, Latur, VNMKV, Parbhani, Maharashtra, India

MN Gawande
M.Sc. (Agri) Student, Department of Soil Science, Post Graduation Institute, Dr. PDKV, Akola, Maharashtra, India

Corresponding Author:
SD Barad
M.Sc. (Agri) Student, Department of Agronomy, College of Agriculture, Latur, VNMKV, Parbhani, Maharashtra, India

Growth and yield of little millet (*Panicum sumatrense* L.) as influence by varieties and row spacings under rainfed condition

SD Barad, PN Karanjikar, AP Sabale, Sneha SB and MN Gawande

DOI: https://doi.org/10.33545/2618060X.2024.v7.i11Sa.1926

Abstract
The field investigation entitled "Response of little millet (*Panicum sumatrense* L.) varieties to row spacings under rainfed condition" was conducted during *kharif* 2023 at Experimental Farm, Agronomy Section, College of Agriculture, Latur. The experiment was laid out in Factorial Randomized Block Design with two factors and replicated thrice. Whereas, first factor comprises the different varieties *viz*. V_1 (Phule Ekadashi), V_2 (OLM-203) and V_3 (BL-6), second factor comprises the three row spacings *viz*. S_1 (22.5 cm × 10 cm), S_2 (30 cm × 10 cm) and S_3 (45 cm × 10 cm). The results revealed that variety BL-6 (V_3) recorded the highest values of growth parameters *viz*. plant height (108.82 cm), number of tillers plant^{-1} (4.86), number of leaves plant^{-1} (17.78), dry matter production plant^{-1} (7.85 g), mean leaf area (13.93 dm^2), leaf area index (4.78) as compared to OLM-203 (V_2) and Phule Ekadashi (V_1). Highest grain yield (1308 kg ha^{-1}) and biological yield (3318 kg ha^{-1}) recorded in BL-6 (V_3) which was significantly superior over OLM-203 (V_2) and Phule Ekadashi (V_1). Numerically highest value of harvest index (39.42%) recorded in BL-6 (V_1). However, among row spacings, closer spacing 22.5 × 10 cm (S_1) recorded higher values of plant height (98.44 cm), number of tillers plant^{-1} (4.52), number of functional leaves plant-1 (17.34), leaf area plant^{-1} (13.65 dm^2), leaf area index (6.06) and dry matter accumulation plant^{-1} (7.70 g) which was at par with row spacing 30 cm × 10 cm (S_2) and significantly superior over row spacing 45 cm × 10 cm (S_3). Grain yield (1115 kg ha^{-1}) and biological yield (2977 kg ha^{-1}) were recorded maximum with row spacing 22.5 cm × 10 cm (S_1) which was found to be at par with row spacing 30 cm × 10 cm (S_2) and significantly superior over 45 cm × 10 cm (S_3).

Keywords: Little millet, row spacings, grain yield, varieties

Introduction
Millets are a diverse group of small-grained grasses that grow only in the semi-arid tropics of Asia and Africa. They are C_4 plants, which means they are more efficient at converting sunlight into energy than other plant types. Millets can produce a moderate amount of nutritious grains and fodder in a short growing season, even in hot and dry conditions. They can also be stored for long periods of time under normal conditions, making them valuable famine reserves. Millets are called climate-resilient crops because they are expected to do well in the changing climate of the future.

Among minor millets little millet (*Panicum sumatrense* L.) is popular millet. It is recognized by various names like kutki in Hindi, samai in Tamil, sama in Telugu, vari in Marathi, sami/vari in Kannada and chama in Malyalam. It is native to India and called Indian millet. The species name is based on specimen collected from Sumatra (Indonesia) (De Wet *et al.*, 1983) [2]. It is mainly cultivated in caucasus China, East Asia, Malaysia and India. Little millet is a self-pollinated and allotetraploid crop with chromosome number of 2n = 4X = 36 belonging to the family Poaceae and sub family *Panicoideae.*

In India, the area under minor millets in year 2021-2022 was 4.23 lakh hectares with a production of 3.75 lakh tonnes and productivity of 885 kg ha^{-1}. Gujarat ranks first in small millet productivity of 1988 kg ha^{-1}. Madhya Pradesh ranks first in small millet production with 0.89 lakh hectare area and 0.77 lakh tonnes production in the year 2021-22 (APEDA, 2022) [1].

The crop has been ecologically sound and environment friendly because of negligible use of pesticide in its production. Little millet is an excellent input for contingency crop planning as it is photo-insensitive, drought tolerance ability and quick growing habit. At early growth stage of crop it can be used as green fodder.

The development and utilization of diverse varieties in agriculture play a crucial role in ensuring a productive, sustainable, and food-secure future. Varieties improve crop resilience and adaptability by enhancing disease resistance and developing tolerance to extreme weather conditions such as drought or heat. Spacing in agriculture refers to the distance between plants or crops, and it plays a crucial role in their growth, health, and productivity. In general, it can also be said that the lack of high-quality seeds and the plant spacings are two reasons for little millet crop's low yield. So, it would seem apparent that choosing appropriate varieties and using appropriate spacings would be necessary.

Keeping in view above considerations, a study entitled "Response of little millet (*Panicum sumatrense* L.) varieties to row spacings under rainfed condition"

Materials and Methods

An experiment was carried out to determine the response of little millet (*Panicum sumatrense* L.) varieties to row spacings under rainfed condition during *kharif* season of 2023-2024 at Experimental Farm, Agriculture College, Latur. The soil of experimental plot was clayey in texture, low in available nitrogen (234.0 kg ha^{-1}), medium in available phosphorous (15.90 kg ha^{-1}) and very high in available potassium (413 kg ha^{-1}). The soil was moderately alkaline in reaction having pH 7.05. After harvesting of crop, nitrogen (220 kg ha^{-1}), phosphorous (14.27 kg ha^{-1}) and potassium (398.43 kg ha^{-1}) was available in the soil.

The experiment was laid out in Factorial Randomized Block Design with nine treatments combinations, consisting of two factors, varieties and row spacings which included three varieties and three row spacings. The first factor consist of different varieties *viz*. V_1 (Phule Ekadashi), V_2 (OLM-203) and V_3 (BL-6) and second factor consist of three row spacings *viz*. S_1 (22.5 cm × 10 cm), S_2 (30 cm × 10 cm) and S_3 (45 cm × 10 cm). Each treatment was replicated three times. The experimental gross plot size was 5.4 x 4.5 m^2 and net plot size was 4.4 x 3.8 m^2. Sowing was done on 7th July 2023. The recommended cultural practices and plant protection measures were undertaken.

Results and Discussion

Growth attributes

Growth attributing characters of little millet *viz*., plant height (cm), number of tillersplant^{-1}, number of functional leaves plant-1, total dry matter production plant^{-1} (g), leaf area plant^{-1} (dm^2) and leaf area index were influenced by varieties and row spacings under rainfed condition are presented in Table 1.

Effect of varieties

Among the little millet varieties, BL-6 (V_3) resulted in higher growth attributes *viz*. plant height (108.82 cm), number of tillers plant^{-1} (4.86), number of leaves plant^{-1} (17.78), dry matter production plant^{-1} (7.85 g), leaf area (13.93 dm^2) and leaf area index (4.78) at all growth stages of the crop than OLM-203 (V_2) and Phule Ekadashi (V_1). Increase in the growth attributes might be due to their genetic constituent. Similar results were reported by Sachin *et al.,* (2023) [10] & Soutade and Raundal (2022) [13].

Effect of row spacings

Among the row spacings, The closer spacing of 22.5 cm × 10 cm (S_1) produced higher value of plant height (98.44 cm), number of tillers plant^{-1} (4.52), number of functional leaves plant^{-1} (17.34), leaf area plant^{-1} (13.65 dm^2), leaf area index (6.06) and dry matter production plant^{-1} (7.70 g) which was at par with 30 cm × 10 cm (S_2) and significantly superior over 45 cm × 10 cm (S_3). It could be attributed to the fact that higher plant density resulted in mutual shading and reduced the availability of light, particularly to lower leaves. As a result, the individual plant tends to grow taller in search of light in higher plant density up to adequate nutrient availability. The decrease in plant height of little millet in wider spacing might be due to availability of more space and solar radiation. Similar result were recorded by Sarala *et al.,* (2020) [11], Siddiqui *et al.,* (2020) [14], Minz *et al.,* (2021) [6] and Reddy and Singh (2021) [9].

Yield

Data in Table 2 revealed that grain and biological yield of little millet was affected significantly due to varieties and row spacings.

Effect of varieties

Among the little millet varieties, Highest grain yield (1308 kg ha^{-1}) and biological yield (3318 kg ha^{-1}) recorded in BL-6 (V_3) which was significantly superior over OLM-203 (V_2) and Phule Ekadashi (V_1). Numerically highest value of harvest index (39.42%) recorded in BL-6 (V_1). Similar results were reported by Maurya *et al.,* (2016) [4], Sachin *et al.,* (2023) [10], Sarawale *et al.,* (2016) [12] and Soutade and Raundal (2022) [13].

Effect of row spacings

Among the row spacings, the narrow row spacing 22.5 cm × 10 cm (S_1) recorded the highest grain yield (1115 kg ha^{-1}) and biological yield (2977 kg ha^{-1}) which was higher than the row spacing 45 cm × 10 cm (S_3) and showed it was followed by row spacing 30 cm × 10 cm (S_2). The harvest index of little millet which was found to be non-significant with respect to row spacings. Narrow row spacing in little millet improved yield by increasing the number of plants per unit area. The denser planting arrangement led to higher total grain yield due to more efficient use of light and nutrients. Thus, higher plant density was the primary reason for higher yield, which was observed with narrower row spacing. Similar result were recorded by Govinakoppa *et al.,* (2021) [3], Sujathamma and Naik (2022) [15] & Syed *et al.,* (2022) [16].

Interaction effect

The effect of interaction between varieties and row spacings on growth and yield attributes was found to be non-significant.

Table 1: Plant height (cm), number of tillers plant^{-1}, number of functional leaves plant^{-1}, leaf area plant^{-1} (dm^2), leaf area index and dry matter production plant^{-1} (g) of little millet as influenced by different treatments.

Treatment	Plant height (cm)	No. of tillers plant^{-1}	No. of functional leaves plant^{-1}	Leaf area plant^{-1} (dm^2)	Leaf area index	Dry matter production plant^{-1} (g)
A: Varieties (V)						
V_1: Phule Ekadashi	68.74	4.39	16.13	12.40	4.18	6.71
V_2: OLM-203	101.73	3.81	15.21	10.71	3.91	5.97
V_3: BL-6	108.82	4.86	17.78	13.93	4.78	7.85
S.Em±	2.20	0.11	0.46	0.36	-	0.22
CD at 5%	6.62	0.35	1.40	1.10	-	0.66
B: Row Spacings (S)						
S_1: 22.5 cm × 10 cm	98.44	4.52	17.43	13.65	6.06	7.70
S_2: 30 cm × 10 cm	94.27	4.46	16.91	12.61	4.43	7.35
S_3: 45 cm × 10 cm	86.58	4.08	14.78	10.77	2.39	5.49
S.Em±	2.20	0.11	0.46	0.36	-	0.22
CD at 5%	6.62	0.35	1.40	1.10	-	0.66
C: Interaction (V×S)						
S.Em±	3.83	0.21	0.81	0.64	-	0.38
CD at 5%	NS	NS	NS	NS	-	NS

Table 2: Grain yield (kg ha^{-1}), biological yield (kg ha^{-1}) and harvest index of little millet as influenced by different treatments

Treatment	Grain yield (kg ha^{-1})	Biological yield (kg ha^{-1})	Harvest index (%)
A: Varieties (V)			
V_1: Phule Ekadashi	903	2632	34.31
V_2: OLM-203	747	2117	35.29
V_3: BL-6	1308	3318	39.42
S.Em±	33.04	75.45	-
CD at 5%	99.05	226.1	-
B: Row Spacings (S)			
S_1: 22.5 cm × 10 cm	1115	2977	37.46
S_2: 30 cm × 10 cm	1017	2751	36.97
S_3: 45 cm × 10 cm	826	2339	35.31
S.Em±	33.04	75.45	-
CD at 5%	99.05	226.1	-
C: Interaction (V×S)			
S.Em ±	57.23	130.6	
CD at 5%	NS	NS	

Plate 1: General view of experimental field (*kharif* 2023)

Plate 2: Drone view of experimental field (*kharif* 2023)

Conclusion

From above results it can be concluded that among varieties, growth attributing characters, grain yield, biological yield, of little millet were significantly higher with BL-6 (V_3). However, narrow row spacing of 22.5 × 10 cm (S_1) resulted in higher growth attributing characters, grain yield and biological yield of little millet and it was followed by row spacing 30 × 10 cm (S_2).

References

1. Apeda. Statistical data on small millets; c2022. Available from: http://apeda.gov.in/milletportal/files/statistics_report.pdf. Accessed December 12, 2023.
2. De Wet JMJ, Prasada Rao KE, Brink DE. Systematics and domestication of *Panicum sumatrense* (Graminae). J Agric Tradit Bot Appl. 1983;30(2):159-68.
3. Govinakoppa K, Kamatar D, Anil Kumar H, Sudha T. Impact of fertilizer, spacing and genotypes on yield, income and related traits in proso millet. Pharma Innov J. 2021;10(11):2277-83.
4. Maurya SK, Nath S, Patra SS, Rout. Effect of different sowing dates on growth and yield of pearl millet (*Pennisetum glaucum* L.) varieties under Allahabad condition. Int J Sci Nat. 2016;7(1):62-9.
5. Mehera B, Dondapati S. Effect of organic manures on growth and yield of varieties of little millet (*Panicum sumatrense*). Pharma Innov J. 2022;11(5):1638-41.
6. Minz SD, Singh AK, Kumar NM, Singh BK. Effect of crop geometry and nitrogen management on growth attributes of pearl millet (*Pennisetum glaucum* L.) under guava-based agri-horti system. Pharma Innov J. 2021;10(9):2191-5.
7. Nandini KM, Sridhara S. Response of growth yield and quality parameters of foxtail millet genotypes to different planting density. Int J Current Microbiol Appl Sci. 2019;8(2):1765-73.
8. Nigade RD, More SM. Performance of finger millet varieties to different levels of fertilizer on yield and soil properties in sub-montane zone of Maharashtra. Int J Agric Sci. 2012;9(2):256-9.
9. Reddy ES, Singh S. Effect of spacing and potassium levels on growth and yield of finger millet (*Eleusine coracana* L.). Asian J Microbiol Biotechnol Environ Sci. 2021;23(2):158-62.
10. Sachin S, Asewar BV, Syed Shireen JR. Response of different little millet (*Panicum sumatrense* L.) varieties to fertilizer levels. Pharma Innov J. 2023;12(1):1590-2.
11. Sarala N, Kumar MH, Madhavilatha L, Vajantha B, Hemalatha T. Effect of spacing and fertilizer levels on growth and yield of little millet. Andhra Pradesh J Agric Sci. 2020;6(2):71-4.
12. Sarawale PP, Rajemahadik VA, Shengade GB, Mane SV. Effect of different varieties and establishment methods on growth and yield of finger millet under Konkan condition. J Indian Soc Coastal Agric Res. 2016;34(2):22-6.
13. Soutade VJ, Raundal PU. Response of little millet varieties to different levels of fertilizers under rainfed condition. J Agric Res Technol. 2022;47(2):131.
14. Siddiqui DA, Sharma GK, Chandrakar T, Thakur AK, Pradhan A. Differential levels of fertilizer and row spacing affects growth and yield of brown top millet (*Brachiaria ramosa* L.) in entisols of Bastar Plateau Zone of Chhattisgarh. Int J Current Microbiol Appl Sci. 2020;9(8):3459-72.
15. Sujathamma P, Santhosh Kumar Naik B. Effect of crop geometry and fertilizer levels on the grain yield of little millet (*Panicum sumatrense* L.) in Rainfed Vertisols. Biol Forum – Int J. 2022;14(4):862-5.
16. Syed JR, Asewar BV, Aher KP, Sachin S. Impact of different plant densities and nutrient levels on growth and yield of little millet (*Panicum sumatrense* L.). Pharma Innov J. 2022;11(12):3052-5.