Journal of Pharmacognosy and Phytochemistry

Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
www.phytojournal.com
JPP 2023; 12(1): 32-34
Received: 11-10-2022
Accepted: 10-12-2022

Vikas G Aghara
M. Sc. Agronomy, Department of Agronomy, B. A. College of Agriculture Anand Agricultural University, Anand, Gujarat, India

VJ Patel
Professor & Head, Department of Agronomy, B. A. College of Agriculture Anand Agricultural University, Anand, Gujarat, India

PS Panchal
Assistant Professor, Department of Agronomy, B. A. College of Agriculture Anand Agricultural University, Anand, Gujarat, India

MP Dohat
Assistant Professor, Department of Agronomy, B. A. College of Agriculture Anand Agricultural University, Anand, Gujarat, India

Corresponding Author:
PS Panchal
Assistant Professor, Department of Agronomy, B. A. College of Agriculture Anand Agricultural University, Anand, Gujarat, India

Effect of age of seedling and spacing on yield attributes and yield of finger millet

Vikas G Aghara, VJ Patel, PS Panchal and MP Dohat

DOI: https://doi.org/10.22271/phyto.2023.v12.i1a.14544

Abstract
An investigation was carried out to study the effect of age of seedling and spacing on yield attributes and yield of finger millet during *kharif* season of the year 2019 on loamy sand soil at College Agronomy Farm, B. A. College of Agriculture, Anand Agricultural University, Anand. The experiment was consisted of twelve treatment combination comprised of three age of seedling (A_1: 14 days, A_2: 21 days and A_3: 28 days) and four spacing (S_1: 20 cm x 15 cm, S_2: 20 cm x 20 cm, S_3: 30 cm x 10 cm and S_4: 30 cm x 15 cm) tested under Randomized Block Design (Factorial) with four replications. The results of an experiment showed that number of fingers/earhead, length of fingers (cm), earhead weight (g), grain weight/earhead (g) and test weight (g) of finger millet were achieved significantly higher with transplanting of 21 days old seedling (A_2). As far as spacing is concern, transplanting of finger millet at 30 cm x 15 cm (S_4) recorded higher yield parameters. However, Grain and straw yield were recorded higher under treatment combination A_2S_3 (transplanting of 21 day old seedling at 30 cm x 10 cm).

Keywords: Age of seedling, spacing, yield, finger millet

Introduction
Finger millet (*Eleusine coracana* L. Gaertn) is a stable cereal food crop for millions of people in the semiarid region of the world, particularly in Africa and India, especially those who live by subsistence farming. It is also a staple food crop in many hilly regions of the country. The crop is well adapted to very poor and marginal uplands where other crops cannot be grown successfully. In India, Finger millet is commonly known as '*Ragi*' and it is commonly known as '*Nagali*' and '*Bavato'* in Gujarat state. Finger millet is one of the most important small millet grown in India and it accounts 7 per cent of the area with 11 per cent of production**.** Finger millet is normally consumed in the form of flour-based foods such as roti and muddle. Finger millet can be used to make porridge, upma, cakes and biscuits. Finger millet flour is used to make various Indian preparations like dosas, idlis and ladoos. The straw is used as animal feed and for roof thatching. Finger millet is an important prevention against malnutrition, especially kwashiorkor. Finger millet is also a rich source of calcium, phosphorus and iron.

Over the last three decades, there has been decline in area and production of finger millet due to low price in the market which forced the farmers to shift to cash crop cultivation and there is emerging trends towards growing cash crops rather than ensuring our own food security. However, there is every need to increase the productivity of finger millet to meet the needs of ever increasing population in India. The demand of finger millet is in increasing trend due to its nutritional value. To satisfy the increasing demand, there is urgent need to increase productivity of finger millet through modification of agronomic practices. Spacing and age of seedlings have great impact on growth and yield parameters of finger millet. Generating the appropriate spacing considering differences in terms of tillering capacity, length of finger, number of finger and plant morphology is important in the case of row planting. In order to increase and sustain finger millet production and productivity, it would be important to do work on spacing and age of seedling in the finger millet through improved agronomic practices.

Materials and Methods
A field experiment was carried out to study the effect of age of seedling and spacing on yield attributes and yield of finger millet during *kharif* season of the year 2019 at College Agronomy Farm, B. A. College of Agriculture, Anand Agricultural University, Anand on loamy sand soil. The soil is alluvial in origin, having 7.46 pH, 0.38% organic carbon, 150.48 kg/ha available N, 30.28 kg/ha available P_2O_5 and 350.30 kg/ha available K_2O.

There were twelve treatment combination comprising three age of seedling (A_1: 14 days, A_2: 21 days and A_3: 28 days) and four spacing (S_1: 20 cm x 15 cm, S_2: 20 cm x 20 cm, S_3: 30 cm x 10 cm and S_4: 30 cm x 15 cm). The experiment was laid down in Randomized Block Design (factorial) with four replications. The plot was kept ready with the help of tractor drawn cultivator for preparing nursery beds for raising the seedling. The seeds of finger millet (Variety : GN 8) was sown in the nursery in three different seed bed keeping the seed rate of 5 kg/ha on the date 17th June, 24th June and 1st July to get the 28, 21, 14 days old seedling, respectively. The seedling of finger millet of different age was used for transplanting as per the treatments. The first light irrigation was given to the crop before transplanting for better transplanting and establishment of the seedlings. The crop was fertilized with recommended dose of fertilizer (40-20-00 kg N, P_2O_5 and K_2O kg/ha) wherein, 50 per cent nitrogen and entire quantity of phosphorus through urea and DAP, respectively as a basal application before transplanting and remaining quantity of nitrogen was applied 30 days after transplanting. In general, different weather parameters were congenial for better growth of the crop during experimental period. The other package of practices was adopted to raise the crop as per the recommendations. In order to represent the plot five plants from each plot selected and labelled and all yield attributes and yield observations was taken from selected plants. Data on various observations recorded during the course of investigation was statistically analyzed as per the standard procedure developed by Cochran and Cox (1957) [1].

Result and Discussion

Effect of age of seedling

Data presented in Table 1 indicated that different age of seedling showed their significant influence on number of tillers/plant counted at 60 DATP. Significantly the highest number of tillers/plant (3.06) was observed under treatment A_2 (Transplanting of 21 days old seedling) while the lowest number of tillers/plant (1.98) was noticed under treatment A_1 (transplanting of 14 days old seeding) at 60 DATP. Number of fingers/earhead, length of fingers, earhead weight, grain weight/earhead, test weight, grain yield and straw yield of finger millet were significantly affected due to different age of seedling. Significantly higher number of fingers/earhead (9.09), length of fingers (7.11 cm), earhead weight (9.38 g), grain weight/earhead (7.65 g), test weight (2.84 g), grain yield (2748 kg/ha) and straw yield (6335 kg/ha) were found under treatment A_2 (transplanting of 21 days old seedling). Treatment A_3 (transplanting of 28 days old seedling) was found statistically at par with treatment A_2 in case of test weight, grain yield as well as straw yield. This result was in conformity with finding of Rajesh (2011) [2] in finger millet. Moreover, the lower yield parameters and yield were observed under treatment A1 (transplanting of 14 days old seedling) which might be due to early transplanted seedling resulted in poor root development.

Effect of spacing's

Results presented in Table 1 further indicated that significantly the highest number of tillers/plant (2.92) was observed under treatment S_4 (30 cm x 15 cm) while significantly lower number of tillers/plant (2.23) was noticed under treatment S_1 (20 cm x 15 cm) at 60 DATP. It might be due to the individual plants could have effectively utilized the available resources such as space, foraging area for root system, light utilization *etc* and thus, enhanced the tiller production in wider spaced treatments. Crop transplanted at 30 cm x 15 cm spacing (S_4) showed their superiority over other treatment by producing significantly higher numbers of fingers/earhead (8.87), finger length (6.98 cm), earhead weight (8.58 g), grain weight/earhead (6.63 g) and test weight (2.82 g) as compared to transplanting of seedlings at 20 cm x 15 cm spacing (S_1). The variation in yield parameters could be attributed to wider spacing which provided congenial condition for better growth and less competition for nutrients, sunlight and water due to low plant population per unit area which ultimately help to produced better yield attributes. However, grain and straw yield were significantly higher when finger millet seedlings was transplanted at 30 cm x 10 cm spacing (S_3) due to increase in total plant population upto optimum level and adoption of planting geometry with optimum spacing where individual plant get sufficient space and thereby proper establishment. Moreover, this treatment was found at par with S_4 (transplanting at 30 cm x 15 cm spacing) for yield parameters like earhead weight, grain weight/earhead and test weight. The results are in accordance with the results of Roy *et al*. (2002) [4], they reported that length of finger/ear head was higher at a wider spacing of 25 cm x 10 cm over closer spacing of 25 cm x 6 cm of finger millet. Similar kind of results was also observed by Pradhan *et al*. (2014) [6].

Interaction Effect

Interaction effect of age of seedling and spacing was found non-significant in all yield parameters except number of tillers/plant. Grain and straw yield of finger millet also reported significant interaction. Number of tillers/plant was recorded significantly the highest under treatment combination A_2S_4 (transplanting of 21 day old seedling at 30 cm x 15 cm). While treatment combination A_1S_1 (transplanting of 14 days old seedling with spacing of 20 cm x 15 cm) and A_1S_3 (14 days old seedling with spacing of 30 cm x 10 cm) statistically similar with each other but recorded significantly the lowest number of tillers/plant. Bhatta *et al*. (2017) [5] also noted higher number of tillers/plant under transplanting of 15 days old seedling of finger millet at 25 cm x 25 cm spacing. Grain yield was recorded significantly higher under treatment combination A_2S_3 (transplanting of 21 day old seedling at 30 cm x 10 cm) but it was at par with treatment combination A_2S_2 (transplanting of 21 day old seedling at 20 cm x 20 cm), A_2S_4 (transplanting of 21 day old seedling at 30 cm x 15 cm) and A_2S_1 (transplanting of 21 day old seedling at 20 cm x 15 cm) while it was lower in case of treatment combination A_1S_1 (Transplanting of 14 day old seedling at 20 cm x 15 cm). Straw yield was recorded higher under treatment combination A_2S_3 (transplanting of 21 day old seedling at 30 cm x 10 cm) but it was at par with treatment combination A_2S_2 (Transplanting of 21 day old seedling at 20 cm x 20 cm) while it was lower in case of treatment combination A_1S_1 (Transplanting of 14 day old seedling at 20 cm x 15 cm).

Table 1: Yield attributes and yield of finger millet as influenced by age of seedling and spacing

Treatment	No of tillers/ plant at 60 DATP	Number of finger/ earhead	Length of fingers (cm)	Earhead weight (g)	Grain weight/ earhead (g)	Test weight (g)	Yield (kg/ha)	
							Grain	Straw
Age of seedling (A)								
A_1: 14 days	1.98	7.64	6.20	7.16	5.31	2.60	1961	4484
A_2: 21 days	3.06	9.09	7.11	9.38	7.65	2.84	2748	6335
A_3: 28 days	2.54	8.41	6.39	8.03	5.84	2.74	2451	5116
S.Em.±	0.06	0.15	0.13	0.18	0.16	0.04	65	137
C.D. at 5%	0.16	0.42	0.39	0.53	0.47	0.12	186	394
Spacing (S)								
S_1: 20 cm x 15 cm	2.23	8.01	6.32	7.79	5.68	2.60	2102	4613
S_2: 20 cm x 20 cm	2.61	8.47	6.55	8.38	6.44	2.75	2484	5614
S_3: 30 cm x 10 cm	2.36	8.18	6.40	8.00	6.32	2.72	2575	5786
S_4: 30 cm x 15 cm	2.92	8.87	6.98	8.58	6.63	2.82	2385	5187
S.Em.±	0.07	0.17	0.16	0.21	0.19	0.05	75	158
C.D 5%	0.19	0.48	0.45	0.61	0.54	0.14	215	455
A x S interaction	Sig.	NS	NS	NS	NS	NS	Sig.	Sig.
C.V. (%)	8.97	6.96	8.19	8.93	10.45	6.08	10.82	10.33

Table 2: Number of tillers/plant, Grain yield and straw yield as influenced by interaction effect of age of seedling and spacing

Treatment	No of tillers/plant at 60 DATP				Grain yield (kg/ha)				Straw yield (kg/ha)			
	S_1	S_2	S_3	S_4	S_1	S_2	S_3	S_4	S_1	S_2	S_3	S_4
A_1	1.50	2.28	1.73	2.43	1346	2178	2236	2084	3384	4940	4999	4472
A_2	2.69	2.99	2.82	3.75	2595	2831	2946	2622	5392	6777	7160	6010
A_3	2.49	2.56	2.54	2.58	2365	2442	2545	2450	5064	5124	5197	5079
S.Em.±	0.11				129				274			
C.D 5%	0.33				372				788			
C.V. (%)	8.97				10.82				10.33			

Conclusion

In the light of the present investigation, it can be concluded that transplanting of finger millet with 21 days old seedling at 30 cm × 10 cm spacing produced higher yield attributes, grain and straw yield of *kharif* finger millet.

References

1. Cochran WG, Cox GM. Experimental designs, John Willey and Sons. Inc., New York, 1957, 546-568.
2. Rajesh K. System of crop intensification in finger millet (*Eleusine coracana* L. Gaertn.) under irrigated condition. M.Sc. (Agri) Thesis submitted to TNAU, Coimbatore; c2011.
3. Ghode N, Choudhary AS, Raj S, Sahu S, Ashish Kumar. Effect of weed management on yield parameters of cauliflower. Int. J. Agric. Food Sci. 2022;4(1):17-20. DOI: 10.33545/2664844X.2022.v4.i1a.60
4. Roy NR, Chakraborty T, Sounda G, Maitra S. Growth and yield attributes of finger millet as influenced by plant population and different levels of nitrogen and phosphorus. Indian Agriculturist. 2002;46(1&2):65-71.
5. Bhatta LR, Subedi R, Joshi P, Gurung SB. Effect of crop establishment methods and varieties on tillering habit, growth rate and yield of finger millet. Agricultural Research and Technology. 2017;11(5):1-3.
6. Pradhan A, Sao A, Patel DP, Mukharjee SC. Effect of different crop establishment methods and weed management practices on finger millet (*Eleusine coracana* L. Gaertn) under rainfed situation. Annals of Agricultural Researc. 2014;35(4):367-372.
7. Avuwa GO, Gershon JF, Antip TM, Nanbyen D, Salahudeen I, Sunday SJ. Comparative nutritional analysis of the flours of finger millet (Eleusine coracona), fonio (Digitaria exillis) and their composite in federal college of education Pankshin, Pankshin local government area of Plateau state.