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Growth of little millet as influenced by varied agronomic interventions

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Abstract
A field experiment was conducted during *kharif*, 2019 on sandy loam soils of S.V. Agricultural College Farm, Tirupati. The experimental design was spilt-split plot and replicated thrice. Three different times of sowing of little millet (II FN of June (T_1), I FN of July (T_2) and II FN of July (T_3)), three methods of establishment (Broadcasting (M_1), Sowing at 30 cm × 10 cm (M_2) and transplanting 20 days old seedlings (M_3)) and three nitrogen levels (20 kg N ha^{-1} (N_1), 30 kg N ha^{-1} (N_2) and 40 kg N ha^{-1} (N_3)) were allotted to main plots, sub plots and sub-sub plots respectively. Results indicated that little millet sown during II FN of June (T_1) resulted in taller plants, higher number of tillers m^{-2}, maximum leaf area and higher drymatter production while all these parameters were at their minimum values with II FN of July (T_3) sowings. With regard to methods of establishment, maximum values of the growth parameters were observed with the transplanting method of establishment (M_3) and the minimum values were obtained with the broadcasted (M_1) crop. Application of 40 kg N ha^{-1} (N_3) recorded higher stature of growth parameters whereas lower values were found with the application of 20 kg N ha^{-1} (N_1). Interaction effect of transplanting method coupled with the application 40 kg N ha^{-1} significantly influenced number of tillers m^{-2} and drymatter production at harvest.

Keywords: Little millet, times of sowing, methods of establishment, nitrogen levels, growth parameters

Introduction
Small millets are the most important species in terms of contributions to food security in regions of Africa and Asia. (Rao *et al.*, 2011) [10]. They are highly nutritious, non glutinous and non-acid forming foods and considered to be the least allergenic and most digestible grains available. Small millets contain about 8 per cent protein and 4 per cent fat. Considering health consciousness and importance of nature's nutraceutical value, demand for this group of crops is ever increasing. Scientific advancements and technologies are essential to meet the growing demand of these crops. Little millet is one among the six small millets grown in most of the regions of scanty and erratic rainfall on poor and marginal soils. Owing to its high nutritional values with low glycemic index, the demand for little millet is increasing today particularly from the people suffering from diabetis. Optimum sowing window is a major factor influencing crop production and directly determines soil temperature and weather conditions to which plants are exposed during different development stages. Therefore, choice of sowing time is considered as an important management option to realize the potential yields. Crop establishment is very vital for realizing optimum plant population and agroecological sustainability, lack of which substantially reduces crop yield. Establishment method plays an important role in efficient utilization of all the available resources for crop growth and development.

Because of its wider adaptability under moisture stress condition and flexibility with sowing time, this crop become promising and popular among the farmers of dry zone. But yield of crop is limited due to its cultivation on marginal and sub-marginal lands with imbalanced nutrition and negligence in cultivation practices. Of all the essential nutrients, nitrogen is the one that is most often limiting the crop growth. Nitrogen is the major macro nutrient which normally produces the greatest yield response in crop plants, promoting rapid vegetative growth and the photosynthetic rate. Lack of technologies which mediate the yield of little millet in Southern agroclimatic zone of Andhra Pradesh is identified which initiated the necessity of planning an experiment for developing agro techniques that enhance the productivity of crop.

Material and Methods

Field experiment was carried out during *kharif*, 2019 at S.V. Agricultural College Farm, Tirupati. The experimental soil was sandy loam in texture, neutral in reaction (pH 6.9), low in organic carbon (0.37 per cent) and low in available nitrogen (177 kg ha^{-1}), medium in available phosphorus (28 kg ha^{-1}) and medium in potassium (216 kg ha^{-1}). The experiment was laid out in split-split-plot design with twenty seven treatment combinations and replicated thrice. The treatments consisted of three times of sowing, three methods of establishment and three nitrogen levels allocated to main, sub and sub-sub plots respectively.

Main plots:	**Sub plots:**	**Sub-sub plots:**
Times of sowing **(3)**	Methods of establishment **(3)**	Nitrogen levels (3)
T_1: II Fortnight of June	**M_1**: Broadcasting	**N_1**: 20 kg N ha
T_2: I Fortnight of July	**M_2**: Sowing at 30 cm x 10 cm	**N_2**: 30 kg N ha
T_3: II Fortnight of July	**M_3**: Transplanting 20 day old seedlings (30 cm × 10 cm)	**N_3**: 40 kg N ha

The variety used in the present experiment OLM-203 (Tarini) was developed from Odisha University of Agriculture and Technology (OUAT), Berhampur, Odisha. It matures in about 105-110 days. The size of the grain is medium bold with dark brown colour. It has a grain yield potential of 10 -11 q ha^{-1}. Healthy and genetically pure seeds of high germination percentage were used for sowing. Seed @ 12 kg ha^{-1} was broadcasted by mixing with sand in the plots prepared and covered thoroughly with the help of hand rake. Little millet seed @ 8 kg ha^{-1} was sown at 30 cm apart by mixing with sand in the open furrow made with the help of hand hoe. The seeds were dropped to a depth of 2 cm and covered thoroughly. The spacing adopted within the row was 10 cm. Nursery bed was prepared and little millet seed @6 kg ha^{-1} was sown on the same dates in which sowing was done in remaining treatments. Healthy seedlings of little millet were pulled from the nursery and transplanted at 30 cm x 10 cm in the main field on the 20th day from the day of sowing done in rest of the plots corresponding to the respective time of sowing. The scheduled nitrogen was applied in two equal splits *viz.*, first half at the time of sowing as basal and remaining half as top dressing at 50 DAS. 20 kg P_2O_5 ha^{-1} was applied commonly to all the plots. K_2O was not applied as there is no recommendation

Results and Discussion

Plant height

Plants of taller stature of little millet were observed when sown during second fortnight of June (T_1), followed by first fortnight of July (T_2) and were comparable with each other. These treatments were in turn significantly superior over July second fortnight (T_3) sowings. Plants with shorter stature of little millet were observed when sown during second fortnight of July (T_3). Transplanting method (M_3) registered significantly superior plant height of little millet compared to other methods of establishment, which were statistically comparable with each other. Shorter plants of little millet were noticed with the broadcasting method of establishment (M_1). Plant height of little millet was significantly higher with the application of 40 kg N ha^{-1} (N_3) compared to other two nitrogen levels, which were on par with each other. Lowest plant height of little millet was recorded with the application of 20 kg N ha^{-1} (N_1).

Number of tillers m^{-2}

Sowing of little millet during second fortnight of June (T_1) resulted in higher number of tillers m^{-2} which is at parity with that of July first fortnight (T_2) sowings. These two were in turn significantly superior to the number of tillers m^{-2} produced by July second fortnight (T_3) sown little millet. Transplanting 20 days old little millet seedlings (M_3) recorded significantly higher number of tillers m^{-2} followed by sowing at 30 cm × 10 cm (M_2) and broadcasting (M_1), which were statistically comparable with each other. However, significantly lower number of tillers m^{-2} was registered with broadcasting (M_1). Little millet when applied with 40 kg N ha^{-1} (N_3) resulted in significantly higher number of tillers m^{-2} than that of 30 kg N ha^{-1} (N_2) which was in turn significantly superior to the number of tillers m^{-2} observed with the application of 20 kg N ha^{-1} (N_1). The interaction effect of transplanting method of establishment in combination with the application of 40 kg N ha^{-1} (M_3N_3) resulted in higher number of tillers m^{-2} which was at par with the number of tillers m^{-2} produced with sowing at 30 cm × 10 cm (M_2N_3). Broadcasting (M_1) method of establishment along with the application of 20 kg N ha^{-1} (M_1N_1) resulted in lower number of tillers m^{-2} of little millet.

Leaf area

Times of sowing influenced the leaf area of little millet at a statistically measurable magnitude. June II FN (T_1) sowing of the crop recorded maximum and significantly higher leaf area relative to rest of the two sowings *i.e.*, during I FN of July (T_2) and II FN of July (T_3). Difference between these two sowings was statistically comparable. Minimum values of leaf area was recorded with July II FN (T_3) sown crop. The leaf area noticed with transplanting method (M_3) of establishment of little millet was at par with that of sowing at 30 cm × 10 cm (M_2) and both were significantly superior over the leaf area recorded with the broadcasting (M_1) method, which resulted in significantly inferior value of leaf area. As regards, nitrogen levels, application of 40 kg N ha^{-1} (N_3) resulted in significantly higher leaf area compared to the other two nitrogen levels, which were having no significant disparity between them. Leaf area of little millet was found minimum with the application of 20 kg N ha^{-1} (N_1).

Drymatter production

Little millet sown during second fortnight of June (T_1) recorded significantly higher drymatter production compared to that of first fortnight of July (T_2), which in turn was significantly superior to the drymatter production registered with the July second fortnight (T_3) sowings. Lowest drymatter production at harvest was found when the crop was sown during second fortnight of July (T_3). Maximum and significantly higher drymatter production was noticed with the transplanting (M_3) when compared to rest of the methods of establishment *i.e.*, sowing at 30 cm × 10 cm (M_2) and broadcasting (M_1) which were significantly comparable with each other. With regard to nitrogen levels, application of 40 kg N ha^{-1} (N_3) resulted in highest amount of drymatter production and was significantly superior to that of 30 kg N ha^{-1} (N_2), which in turn was statistically comparable with N_1 (20 kg N ha^{-1}). However, lowest drymatter production in little

millet was observed with the application of 20 kg N ha^{-1} (N_1). Statistically perceptible interaction effect was observed between methods of establishment and nitrogen levels. Significantly superior amount of drymatter production was registered when little millet was established through transplanting along with the application of 40 kg N ha^{-1} (M_3N_3). Broadcasted little millet in combination with 20 kg N ha^{-1} (M_1N_1) resulted in lowest amount of drymatter production.

Growth stature of little millet was highest with the June II FN (T_1) sowing. This might be due to the fact that the early sown crop might have enjoyed favorable climatic conditions in terms of temperature, rainfall and other climatic parameters which attribute to the crop growth at different stages and resulted in maximum plant height, number of tillers m^{-2}, leaf area and drymatter production. These results are in accordance with the findings of Ashoka and Halikatti (1997) [2], Pendiselvi *et al.*, (2010) [8], Gavit *et al.*, (2017) [3] and Mubeena *et al.* (2019) [7]. Crop growth was at maximum with transplanted little millet due to less competition for light interception and better utilization of sun light. The better root growth of seedlings under transplanting method facilitated increased cell division and cell enlargement which finally lead to enhanced growth parameters. Kalaraju (2007) [6], Sarawale *et al.* (2016) [11], Shantappa *et al.*, (2016) [12] and Hebbal *et al.* (2018) [5] reported similar findings. The effect of N on cell division, protein synthesis and meristematic growth through hormonal synthesis resulted in higher plant height, number of tillers m^{-2}, leaf area and drymatter production. These results are in line with the findings of Hasan *et al.* (2013) [4], Pradhan *et al.*, (2015) [9] and Arshewar *et al.* (2018) [1].

Table 1: Effect of times of sowing, methods of establishment and nitrogen levels on growth parameters of little millet

Treatments	Plant height (cm)	No. of tillers m^{-2}	Leaf area (cm^2)	Drymatter Production (kg ha^{-1})
Times of sowing				
T_1: II Fortnight of June	129.2	167.4	493.3	3526
T_2: I Fortnight of July	122.0	162.5	449.0	3135
T_3: II Fortnight of July	112.3	152.1	370.2	2694
S.Em ±	1.58	1.33	3.69	47.6
CD (P = 0.05)	9.6	8.1	22.4	290
Methods of establishment				
M_1: Broadcasting	114.2	139.8	404.1	2552
M_2: Sowing at 30 cm x 10 cm	120.6	167.6	442.6	3198
M_3: Transplanting 20 day old seedlings (30 cm × 10 cm)	128.7	178.5	465.8	3605
S.Em ±	1.97	2.32	7.66	69.3
CD (P = 0.05)	5.6	7.2	23.6	213
Nitrogen levels				
N_1: 20 kg N ha^{-1}	116.2	145.2	405.4	2718
N_2: 30 kg N ha^{-1}	119.4	162.9	433.8	3147
N_3: 40 kg N ha^{-1}	127.8	177.7	473.4	3491
S.Em ±	1.92	2.74	11.40	72.6
CD (P = 0.05)	5.9	7.8	32.7	208
Interaction				
TxM				
S.Em ±	3.14	3.54	11.45	108.9
CD (P = 0.05)	NS	NS	NS	NS
TxN				
S.Em ±	3.20	4.09	16.54	113.2
CD (P = 0.05)	NS	NS	NS	NS
MxN				
S.Em ±	3.20	4.51	17.85	123.9
CD (P = 0.05)	NS	13.2	NS	363
TxMxN				
S.Em ±	0.81	1.01	3.81	28.8
CD (P = 0.05)	NS	NS	NS	NS

Table 2: Interaction effect of methods of establishment and nitrogen levels on number of tillers m^{-2} and drymatter production

No. of tillers m^{-2}					Drymatter production (kg ha-1)				
	M_1	**M_2**	**M_3**	**Mean of N**		**M_1**	**M_2**	**M_3**	**Mean of N**
N_1	131.8	147.3	156.7	145.2	N_1	2367	2798	2988	2718
N_2	140.9	167.0	180.9	162.9	N_2	2578	3258	3605	3147
N_3	146.6	188.6	197.9	177.7	N_3	2712	3538	4223	3491
Mean of M	139.8	167.6	178.5		Mean of M	2552	3198	3605	
S.Em ± (M×N)		4.51			S.Em ± (M×N)		123.9		
CD (P = 0.05)		13.2			CD (P = 0.05)		363		

Conclusion

Growth stature of little millet was at its maximum when the crop was established through transplanting method during second fortnight of June. Nitrogen dose of 40 kg N ha^{-1} applied in two equal splits one basal and another at flowering stage resulted in better growth parameters of little millet.

Reference

1. Arshewar SP, Karanjikar PN, Dambale AS, Kawde MB. Effect of nitrogen and zinc levels on growth, yield and economics of pearl millet (*Pennisetum glaucum* L.). International Journal of Bio -resource and Stress Management 2018;9(6):729-732.
2. Ashoka MB, Halikatti SI. Response of finger millet (*Eleusine coracana* Gaertn.) genotypes to time of sowing in Northern Transitional tract of Karnataka. Karnataka Journal of Agricultural Sciences 1997;10(2):292-297.
3. Gavit HD, Rajemahadik VA, Bahure GK, Jadhav MS, Thorat TN, Kasture MC. Effect of establishment techniques and sowing time on Yield and Yield Attributes of Proso Millet (*Panicum miliaceum* L.). International Journal of Current Microbiology and Applied Sciences 2017;6(5):1523-1528.
4. Hasan MS, Rashid MH, Rahman QA, Almamun MH. Influence of seed rates and levels of NPK fertilizers on dry matter accumulations and yield performance of foxtail millet (*Setaria italica* L. Beauv.). Bangladesh Journal of Agricultural Research 2013;38(4):689-704.
5. Hebbal N, Ramachandrappa BK, Mudalagiriyappa, Thimmegouda MN. Yield and economics of finger millet with establishment methods under different planting geometry and nutrient source. Indian Journal of Dryland Agriculture Research and Development 2018;33(1):54-58.
6. Kalaraju K. Response of finger millet genotypes to methods of planting under organic farming. M.Sc. (Agri.) Thesis, University of Agricultural Sciences, Bengaluru, Karnataka, India 2007.
7. Mubeena P, Halepyati AS, Chittapur BM. Effect of date of sowing and nutrient management on nutrient uptake and yield of foxtail millet (*Setaria italic* L.). International Journal of Bioresource and Stress Management 2019;10(1):092-095.
8. Pendiselvi T, Narayanan AL, Karthikeyan R. Evaluation of optimum time of sowing of finger millet (*Eleusine coracana* G.) varieties in Karaikal region. International Journal of Agricultural Sciences 2010;6(1):94-96.
9. Pradhan A, Sao A, Patel DP, Nag SK, Mukherjee SC. Effect of establishment methods and nitrogen levels on finger millet (*Eleusine coracana* L. Gaertn). Annals of Agricultural Research 2015;36(1):107-113.
10. Rao BR, Nagasampige MH, Ravikiran M. Evaluation of nutraceutical properties of selected small millets. Journal of Pharmacy and Bioallied Sciences 2011;3(2):277-279.
11. Sarawale PP, Rajemahadik VA, Shendage GB, Mane SV. Effect of different varieties and establishment methods on growth and yield of finger millet (*Eleusine coracana* L. Gaertn.) under Konkan condition. Journal Indian Society coastal Agricultural Research. 2016;34(2):22-26.
12. Shantappa D, Kumar RM, Desai BK, Pujari BT, Tirupataiah K, Koppalkar BG *et al*. Influence of establishment methods, irrigation water levels and weed management practices on growth and yield of rice (*Oryza sativa*). Indian Journal of Agronomy 2016;61(2):174-178.