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Evaluate the establishment techniques on growth and yield of finger millet (*Eleusine coracana*)

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Abstract
Field experiment was conducted at Agricultural College and Research Institute, Killikulam during *rabi* season (Nov – Mar) of 2018-19, to evaluate the different crop establishment techniques on growth and yield of finger millet. The experiment was laid out in Randomized Block Design, replicated with thrice using Co (Ra) 15 as the test variety. To accomplish the objectives, the experiment was planned with the following treatments *viz.*, The treatment structure comprises of Broadcasting (T_1), Line sowing of 30 x 10 cm (T_2), Random planting (T_3), Line planting of 30 x 10 cm (T_4), Square planting of 20 x 20 cm (T_5), Square planting of 25 x 25 cm (T_6), Square planting of 30 x 30 cm (T_7) and Seedling throwing (T_8). Observation on plant height, number of tillers m^{-2}, leaf area index, dry matter production, number of ear heads^{-1}, number of fingers earhead^{-1}, number of grains earhead^{-1}, grain and straw yield were recorded. Among the different methods of establishment, square planting of 25 x 25 cm (T_6) significantly increased the plant height (105.4 cm), number of tillers m^{-2} (106), leaf area index (4.9), DMP (6820 kg ha^{-1}), number of ear heads^{-1}, (89), number of fingers earhead^{-1} (8.7), and number of grains earhead^{-1} (1716). Similarly the seed yield (2590 Kg ha^{-1}) and straw yield (4020 Kg ha^{-1}) were also registered higher under square planting of 25 x 25 cm (T_6). The increase in grain yield recorded under square planting (25 x 25 cm) over random planting, line sowing and broadcasting were 19, 28 and 40 per cent, respectively. Square planting of 25 x 25 cm, proved to be the most profitable treatment in terms of higher growth and yield in finger millet cultivation.

Keywords: finger millet, broadcasting, square planting, growth, yield

Introduction
Finger millet (*Eleusine coracana* L.) is commonly known as Ragi belongs to the Poaceae family is widely cultivated in various parts of India and in the entire world. India is the major producer of finger millet contributing nearly 60% of the global production. Finger millet has the ability to adjust itself to different agro-climatic conditions which reflects it having highest productivity among millets. (Gull *et al*., 2014) [2]. Finger millet (*Eleusine coracana* L.) commonly known as ragi in India, is one of the important millet crops cultivated for grain and fodder purpose under varied agro-climatic conditions. It covered maximum area among the small millets. It is nutritionally superior to many cereals hence commonly known as "Nutritious millet" as it providing proteins, minerals, calcium and vitamin in great quantity to the people. In India, it is grown in an area of 1.01 m ha with the production of 1.38 m t and the productivity is 1363 kg ha^{-1}. In Tamil Nadu, finger millet is a prominent crop among small millets. It has been growing in an area of 0.61 L ha with 1.14 L t production and 1865 kg ha^{-1} productivity (INDIASTAT, 2017) [3]. Other major finger millet growing states in India are Karnataka, Tamil Nadu, Andhra Pradesh, Orissa, Jharkhand, Maharashtra and Uttaranchal.
Establishment techniques, plant density, nutrient and water management etc., need to be standardized to achieve the reported yield potential of finger millet under different duration in various environments. Method of establishment is one of the cultural practices, which influences the crop through its effect on growth and development (Gopi *et al*., 2006) [1]. The secret of boosting its yields mainly lies in methods of establishment. Method of establishment play important role to fully exploit all available resources for growth as it provides optimum growing condition. Because of the need to develop appropriate crop establishment methods

to improve finger millet yield, this study was undertaken to evaluate the establishment techniques on growth and yield of finger millet.

Methodology

Field experiment was conducted during *rabi* season of 2018-19 at Agricultural College and Research Institute, Killikulam, Thoothukudi district with the aim of sustaining finger millet production under different crop establishment methods. The experiment was laid out in a randomized block design with three replications. The treatment structure comprised of Broadcasting, Line sowing of 30 x 10 cm, Random planting, Line planting of 30 x 10 cm, Square planting of 20 x 20 cm, Square planting of 25 x 25 cm, Square planting of 30 x 30 cm and Seedling throwing. The variety Co (Ra) 15 was used as a test variety. Regarding broad casting and line sowing, dry seeds were used for sowing. With respect to random and line planting, 20-24 days old seedlings were used for transplanting. For square planting, seedlings of 14 to 18 days raised under mat nursery were used for transplanting. The growth, yield characters, grain and straw yield were recorded.

Results and Discussion

Growth characters: The data from the table 1 revealed that square planting of 25 x 25 cm increased the growth parameters of finger millet *viz*., plant height (105.4 cm), number of tillers m^{-2} (106), leaf area index (4.9) and dry matter accumulation (6820 kg ha^{-1}) as compared to line planting, random planting, line sowing, broadcasting and other establishment techniques. The increased growth parameters may be attributed to the fact that each individual plant in square planting got the advantages of more and liberal nutrients, space and other growth resources due to less competition of lower plant population followed by square planting of 30 x 30 cm and 20 x 20 cm, respectively. Planting in square method with wider spacing might have resulted in profused tillering, which might have facilitated plants for better utilization of the resources (Udaykumar, 2005). There was a progressive increase in plant height and number of tillers under square planting, when compared to random transplanting and other establishment techniques. The transplanting of younger seedlings in square planting might have established quickly in the field and started growing at a faster rate leading to higher growth characters (Krishna *et al*., 2008) [5]

Table 1: Crop establishment techniques on growth characters of finger millet

Treatment	Plant height (cm)	No. of tillers m^{-2}	LAI	DMP (Kg/ha)
Broadcasting	88.6	44	3.2	4225
Line sowing (30 x 10 cm)	90.1	56	3.4	4740
Random planting	96.8	84	4.3	5640
Line planting (30 x 10 cm)	93.2	66	3.9	4920
Square planting (20 x 20 cm)	99.4	92	4.6	5810
Square planting (25 x 25 cm)	105.4	106	4.9	6820
Square planting (30 x 30 cm)	102.3	97	4.7	6450
Seedling throwing (*Awanti*)	95.3	80	4.2	5530
SE.d	0.91	1.9	0.07	81.0
CD (p=0.05%)	1.9	4.2	0.16	165

Yield attribute sand yield

The grain yield per unit area in finger millet is a function of yield attributes of an individual plant. Square planting significantly influenced the yield characters (Table 2). Among the different methods of establishment, square planting of 25 x 25 cm recorded the higher number of ear heads m^{-1} (89), number of fingers $earhead^{-1}$ (8.7), and number of grains $earhead^{-1}$ (1716). The result revealed that square planting method of establishment higher than in some of these yield contributing characters and improved the yield attributes and there by grain yield over line planting, random planting, line sowing, broadcasting and other establishment techniques. Similarly the higher grain and straw yield were also recorded under the square planting of 25 x 25 cm spacing. The increase in grain yield recorded under square planting (25 x 25 cm) over random planting, line sowing and broadcasting were 19, 28 and 40 per cent, respectively. Square planting provided better aeration, more spacing, and less competition, which enabled the plants to grow vigorously. The increase in the grain yield under squarer planting of 25 x 25 cm was attributed to large root volume, profuse and strong tillers with big panicles, more and well filled spikelets with higher grain weight (Satyanarayana and Babu, 2004) [7]. Similar findings were recorded by Jayadeva *et al.* (2008) [4].

From this study, it can be concluded that square of planting was found to be superior in finger millet cultivation. Square planting of 25 x 25 cm resulted in better growth, yield characters and yield than that of random planting, line planting, seedling throwing, line sowing and broadcasting. Hence, the square planting of 25 x 25 cm is more promising establishment method of finger millet in enhancing higher growth and productivity.

Table 2: Crop establishment techniques on yield characters and yield of finger millet

Treatment	No. of ear heads m^{-2}	No. of fingers $earhead^{-1}$	Number of grains $earhead^{-1}$	Grain yield (Kg ha^{-1})	Straw yield (Kg ha^{-1})
Broadcasting	64	6.2	817	1560	2850
Line sowing (30 x 10 cm)	67	6.5	950	1840	3120
Random planting	76	7.8	1295	2102	3530
Line planting (30 x 10 cm)	71	6.9	1078	1750	3200
Square planting (20 x 20 cm)	80	8.0	1465	2210	3650
Square planting (25 x 25 cm)	89	8.7	1716	2590	4020
Square planting (30 x 30 cm)	84	8.3	1589	2460	3840
Seedling throwing (*Awanti*)	74	7.7	1213	2040	3420
SE.d	1.8	0.07	61	51	57
CD (p=0.05%)	2.9	0.15	123	105	118

References

1. Gobi R, Ramesh S, Pandian BJ, Chandrasekaran B, Sampathkumar T. Evaluation of crop establishments and split application of N and K on growth, yield attributes, yield and economics of Hybrid Rice Co RH2. Asian J. of Plant Sci. 2006; 5(6):1022-1026.
2. Gull A, Jan R, Nayik GA, Prasad K, Kumar P. Significance of finger millet in nutrition, health and value- added products: a review. Magnesium (mg). 2014; 130(32):120.
3. Area, Production, Productivity of Millets in India https://www.indiastat.com. INDIASTAT, 2017.
4. Jayadeva HM, Prabhakar Setty TK, Bhandi AG.. Performance of SRI method of rice establishment under Bhadra command of Karnataka. Proc. of 3rd Nation. Symp. SRI India. Policies, Institutions Strat. Scaling up Coimbatore, Tamil Nadu Agric. Univ., 2008, 33-35.
5. Krishna A, Biradarpatil NK, Channappagoudar BB. Influence of System of Rice Intensification (SRI) cultivation on seed yield and quality. Karnataka J. Agric. Sci. 2008; 21(3):369-372
6. Ministry of Agriculture and Farmers Welfare, Govt. of India. Selected State-wise area, production and productivity of finger millet. In, 2017. http://www.indiastat.com.
7. Satyanarayana A, Babu KS. A revolutionary method of rice cultivation. In: Manual of System of Rice Intensification (SRI), Acharya N.G. Ranga Agric. Univ., 2004, 1.