EFFECT OF ESTABLISHMENT METHODS AND NUTRIENT LEVELS ON GROWTH AND YIELD OF FINGER MILLET (*Eleusine corocana* L.)

ABSTRACT:

A field experiment was conducted during kharif season (2021) at Crop Research Farm, Department of Agronomy, SHUATS, Allahabad (U.P.). The soil of experimental plot was sandy loam in texture. The treatment consisted of T_1-Transplanting+75% RDF, T_2-Transplanting+100% RDF, T_3-Transplanting+125 % RDF, T_4- Broadcasting+75% RDF, T_5-Broadcasting+100% RDF, T_6-Broadcasting+125% RDF, T_7-Line sowing +75%RDF, T_8-Line sowing +100%RDF, T_9- Line sowing +125%RDF.The experiment was laid out in Randomized Block Design, with 9 treatments replicated thrice. Results revealed that maximum plant height (94.7 cm), numbers of tillers per plant (7.5), plant dry weight (22.97 g/plant), Effective tillers per m^2(172.3), test weight (3.8 g), number of grains per finger (2240), finger weight (11.4 g), grain yield (3.2 t/ha), straw yield (4.48 t/ha) and maximum gross returns (Rs.1,12,544), net returns (Rs.74,168) and B:C ratio (1.9) was recorded and significantly influenced with the treatment Transplanting + 125 % RDF. It can be concluded, that the treatment Transplanting + 125 % RDF was more productive and cost effective.

Key words: *Finger millet, planting methods, nutrient levels, yield attributes, kharif.*

1. INTRODUCTION

Finger millet (*Eleusine coracana* L.) belongs to family Poaceae. It is an annual herbaceous plant widely grown as a cereal crop in the arid and semiarid areas of Africa and Asia. Finger millet is a tufted annual cereal crop growing 40-150 cm tall, taking between 2.5 and 6 months to mature. In India, it is cultivated in Karnataka, Tamil Nadu, Andhra Pradesh, Orissa, Jharkhand, Uttaranchal, Maharashtra, and Gujarat, Finger millet occupied an area of 1.19 million hectares accounting for a production of 1.98 million tonnes **(Sakamma *et al.,* 2018).** The grain contains 9.2% proteins, 1.29% fats, 76.32% carbohydrates, 2.2% mineral, 3.90% ash, and 0.33% calcium.

Method of establishment is one of the cultural practices, which influences the crop through its effect on growth and development **(Gopi *et al.,* 2006).** The secret of boosting its yields mainly lies in methods of establishment which play an important role to fully exploit all available resources for growth as it provides optimum growing condition. Transplanting is an economically and environmentally ideal alternative to seeding.

Nitrogen, phosphorous and potassium are the essential elements required for plant growth in relatively large amounts. Nitrogen plays an important role in building units of proteins in the plant system **(Huber and Thompson *et al.,* 2007).** Phosphorous also plays a vital role in increasing the yield. It is an important nutrient in energy transfer for the living cells by means of high-energy phosphate bonds of ATP. Potassium increases water use efficiency and transforms sugars to starch in the grain-filling process.

2. MATERIALS AND METHODS

The experiment was carried out during *Kharif* season of 2021, at the CRF (Crop Research Farm) SHIATS, Department of Agronomy, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj, Uttar Pradesh. The Crop Research Farm is situated at 25.75^0 N latitude, 87.19^0 E longitude and at an altitude of 98m above mean sea level. Prayagraj has a subtropical and semi-arid climatic condition, with both extremes of temperature, *i.e*., winter and summer. The soil of the experiment field contains soil Ph of about 6.9, available nitrogen 278.93 Kg/ha, available phosphorus 10.8 Kg/ha, available Potassium 206.4 Kg/ha. The experiment was laid out in Randomized Block Design (RBD) with three replications and nine treatments: T_1- Transplanting + 75 % RDF, T_2- Transplanting + 100 % RDF, T_3- Transplanting + 125 % RDF, T_4- Broadcasting + 75 % RDF, T_5- Broadcasting + 100 % RDF, T_6- Broadcasting + 125 % RDF, T_7- Line sowing + 75 % RDF, T_8- Line sowing + 100 % RDF, T_9- Line sowing + 125 % RDF. The recommended RDF for the crop is 60:30:30 Kg/ha. Finger millet GPU- 28 variety was used with spacing of 30×10 cm with an area of 3 × 3 m for each plot. A well – drained fertile soil with good irrigation facility is selected for growing nursery, and 17 days age seedlings were used for transplanting and transplanting was done

with 2 seedlings per hill. One quadrate was harvested in every plot for the determination of results and data was subjected to statistical analysis separately by using analysis of variance technique. The difference among treatment means was compared by using least significant difference test at 5% probability levels.

3. RESULTS AND DISCUSSION

3.1 Growth Parameters

Growth parameters of finger millet were measured in terms of Plant height (cm), number of tillers per plant, plant dry weight(g/plant) at harvesting were shown in the Table1. significantly taller plant height (94.7 cm) was recorded with application of 125% RDF + Transplanting. However, treatment of Line sowing + 125 % RDF (92.7 cm) was statistically at par with the treatment 125 % RDF + Transplanting. Increase in plant height might be due to the transplanting shock, which helps in vigorous plant growth and development of new roots. Application of 125 % RDF provides sufficient nutrient to the plant which leads to anatomical changes such as increase in size of cells, intercellular spaces, thinner cell walls and lower development of epidermal tissue resulted to increase in plant height. Similar findings were reported by **Raundal *et al.* (2017)**, significantly highest number of tillers was recorded with the treatment of Transplanting+125% RDF (7.5). However, treatment with Line sowing + 125% RDF (6.9) was statistically at par with treatment of Transplanting + 125 % RDF. Transplanted plants would have utilized the available sources such as spacing, forage area for root system, light utilization further enhanced the tiller development. Increased RDF provides much availability of nutrients which helps in development of axillary bud from which tillers are emerged. Similar findings were observed in **Sunitha *et al.* (2004), Deshmukh and Pradhan (2011).** Significantly highest plant dry weight was recorded with treatment of Transplanting + 125 % RDF (22.97 g). However, treatment with Line sowing + 125 % RDF (22.02 g) and Broadcasting + 125 % RDF (21.55 g) were statistically at par with treatment of Transplanting+ 125 % RDF. Highest dry matter accumulation was observed because of highest plant height and number of tillers due to the fact that increase in levels of RDF. Similar findings were observed in **Triveni *et al.* (2017).**

Table 1 Effect of establishment methods and nutrient levels on growth attributes of Finger millet

Treatment details	Plant height (cm)	No of tillers	Plant dry weight (g/plant)
Transplanting + 75% RDF	86.9	6.1	18.74
Transplanting + 100% RDF	90.1	6.6	20.25
Transplanting + 125% RDF	94.7	7.5	22.97
Broadcasting + 75% RDF	82.4	4.0	18.13
Broadcasting + 100% RDF	85.4	4.4	19.93
Broadcasting + 125 % RDF	89.0	4.6	21.55
Line Sowing + 75% RDF	85.2	5.3	19.50
Line Sowing + 100% RDF	87.7	6.2	21.12
Line Sowing + 125 % RDF	92.7	6.9	22.02
F- test	S	S	S
SEm (±)	0.99	0.16	0.84
CD (5%)	2.98	0.49	2.52

3.2 YIELD ATTRIBUTES

Yield attributes of Finger millet was measured in terms of number of tillers per m^2, number of grains per ear-head, finger weight (g), test weight(g) at harvesting was shown in the table 2. Significantly highest number of effective tillers per m^2 was recorded with treatment Transplanting + 125 % RDF ((172.3). However, treatment with Transplanting + 100 % RDF (165.3) was statistically at

par with the treatment of Transplanting + 125 % RDF, significantly highest number of grains per ear-head was recorded with treatment Transplanting + 125 % RDF (2240). However, treatment with Line sowing + 125 % RDF (2057) was statistically at par with the treatment Transplanting + 125 % RDF, significantly highest finger weight was recorded with treatment Transplanting + 125 % RDF (11.4g). However, treatment with Line sowing + 125 % RDF (10.6g) was statistically at par with the treatment of Transplanting + 125 % RDF, significantly highest test weight was recorded with treatment Transplanting + 125 % RDF (3.8 g). However, treatment with Broadcasting + 75 % RDF (3.5 g) was recorded minimum. Highest test weight is due to the fact that higher sink to source relationship leads to higher values of test weights. Similar results were found by **Raundal *et al*. (2017)**

Table 2. Effect of establishment methods and nutrient levels on yield attributes of Finger millet

Treatment details	Tillers per m^2	Number of grains per ear-head	Finger weight (g)	Test weight(g)
Transplanting + 75% RDF	142.3	1837.3	8.3	2.9
Transplanting + 100% RDF	165.3	2001.3	9.6	3.3
Transplanting + 125% RDF	172.3	2240.0	11.4	3.8
Broadcasting + 75% RDF	125.0	1661.3	6.1	2.4
Broadcasting + 100% RDF	134.3	1748.0	7.4	2.6
Broadcasting + 125 % RDF	143.3	1853.3	8.4	3.2
Line Sowing + 75% RDF	136.0	1953.3	8.2	2.7
Line Sowing + 100% RDF	149.3	1985.7	9.4	3.1
Line Sowing + 125 % RDF	164.0	2057.0	10.6	3.5
F- test	**S**	**S**	**S**	**S**
SEm (±)	2.14	36.27	0.29	0.07
CD (5%)	6.44	108.74	0.86	0.20

3.3 YIELD

Yield of Finger millet was measured in terms of grain yield, stover yield, harvest index. Significantly highest grain yield was recorded with treatment Transplanting + 125 % RDF (3.16 t/ha). However, treatment with Line sowing + 125 % RDF (3.12 t/ha) was statistically at par with the treatment Transplanting + 125%RDF. Increase in grain yield is due to the increased growth parameters and yield attributes. It is fact that yield per unit area is higher with decreased plant population. Increased application of nutrients results in high chlorophyll synthesis and also it effects source to sink relationship which reflects higher yields. Similar findings were found by **Raundal *et al*. (2017) and Sarwale *et al*. (2017).** Significantly highest stover yield (4.48t/ha) was recorded with treatment Transplanting + 125 % RDF. However, treatment with Line sowing + 125 % RDF (4.41 t/ha) was statistically at par with Transplanting + 125 % RDF.Increase of straw yield is due to the fact that the crop absorbed proportionately higher amount of N, P and K due to their higher availability under lower plant population and less competition among the plants for growth resources. Similar findings were observed by **Sarwale *et al*. (2017).** Treatment with Transplanting + 125 % RDF was recorded maximum Harvest index (42.7 %). Higher harvesting index was noticed due to the increment in both grain and stover yield in turn resulted in higher harvest index. Similar findings were observed in **Girisha *et al.* (2020).**

Table 3. Effect of establishment methods and nutrient levels on yield of Finger millet

Treatment details	Grain yield (t/ha)	Stover yield (t/ha)	Harvest index (%)

Transplanting + 75% RDF	2.78	3.88	41.8
Transplanting + 100% RDF	3.01	4.20	41.8
Transplanting + 125% RDF	3.16	4.48	42.7
Broadcasting + 75% RDF	2.51	3.52	39.8
Broadcasting + 100% RDF	2.68	3.62	41.7
Broadcasting + 125 % RDF	2.88	3.84	42.5
Line Sowing + 75% RDF	2.63	3.74	42.0
Line Sowing + 100% RDF	2.91	4.09	41.7
Line Sowing + 125 % RDF	3.12	4.41	41.2
F- test	S	S	NS
SEm (±)	0.08	0.07	0.86
CD (5%)	0.23	0.22	----

4. CONCLUSION

From the above findings it is concluded that Transplanting + 125 % RDF was found more productive in terms of growth, yield attributes and yield.

5. FUTURE SCOPE

As there was less research happened in the field, further research should be done to obtain proper results and help farmers to choose better performing hybrid. Since the findings are based on the research done in one season, further trails are needed to confirm the results of this experiment.

6. REFERENCE

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