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Effect of row spacing and poultry manure on the growth and yield of finger millet (*Eleusine coracana* L.)

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Abstract
A field trail was carried out at Crop Research Farm, Naini Agricultural Institute, Department of Agronomy, Sam Higginbottom University Agriculture, Technology and Sciences, (SHUATS), Prayagraj, (U.P.) during *kharif* season 2020 to study. "Effect of Row Spacing and Poultry manure on Growth and Yield of Finger Millet (*Eleusine coracana* L.)". The experiment was done in randomized block design (RBD) with nine treatment replicated three times. The factor consist of Row Spacing (20× 10, 30×10, 40×10 cm.) and three levels of Poultry manure (2.0, 2.5, 3.0 t/ha) were taken into use. The result which appeared that application of T6 (30×10cm+3.0 t/ha poultry manure) recorded maximum plant height (72.91cm), leaf area (526.37 cm^2), leaf area index (4.40), number of tillers/plant (7.20), plant dry weight (14.27g), number of fingers/plant (6.07), test weight (3.65g), grain yield (3.04 t/ha), stover yield (6.58 t/ha), biological yield (9.61 t/ha) and harvest index (31.89%). Whereas maximum relative growth rate (0.044 g/g/day) and crop growth rate (0.396 g/m^2/day) was recorded with application of T2 (20× 10+2.5 t/ha poultry manure). Maximum gross return (121600), net return (84600), and B: C ratio (2.27) were recorded with application of T6 (30×10 cm+3.0 t/ha poultry manure).

Keywords: Education intervention, lifestyle modification, Nutrition knowledge, PCOS, Socio-economic status

Introduction
Among various millets, finger millet (*Eleusine coracana* L.) provides staple food in relatively short period and has a pride of place in having the highest productivity among millets Patel and Shroff (2020) [11]. It is the third most widely cultivated millets after pearl millet and foxtail millet in the semi-arid tropical and subtropical regions of the world. The striking feature of finger millet is its ability to adjust to different agro-climatic conditions, easy cultivation, free from major pests and diseases and drought tolerance, effective in suppressing weed growth, and able to grow on marginal lands with poor soil fertility have made this crop an indispensable component of dry farming system. Prakasha *et al.*, (2018) [12]. It is an important food grain crop of semi-arid tropics particularly of India. It requires minimum rainfall of around 350-400 mm for successful cultivation but can be grown successfully in the areas receiving rainfall up to 1000 mm. It can be grown on a wide range of soils from very poor to very fertile. However, well drained loam or clay loam soils are best for finger millet cultivation. The grain content 9.2% proteins, 1.29% fats, 76.32% carbohydrates, 2.2% mineral, 3.90% ash, 0.33% calcium. Vitamin A, B and phosphorus are also present in smaller quantity, iodine content in finger millet is reported to be the highest among food grain. Finger millet taste better than most other cereals. It has no major pest problem and so can be stored cheaply for a long time. It makes good fodder and contain up to 61% of total digestible nutrients with the findings of Upadhyaya *et al.*, (2006).
The information on sustainable productivity of finger millet with use of organic manures viz., Poultry manure, FYM, urban garbage compost, sewage sludge and vermi compost in finger millet is essential. The soil is Loosing its productivity over year making the farming more miserable. In order to bring back the productivity of soil, it needs to improve physical, chemical and biological properties of soil. Organic farming is being advocated as an alternate farming system for sustainable agriculture. A stage has reached that supplementary and complementary role of organic materials is being felt once again for sustainable agriculture and to keep the soil health. In the past, research on fertilizer use in our country was mainly confirmed to the nutritional requirement of individual crops through chemical farming.

But recently, there has been a shift in research priority from individual crops to cropping system and organic farming. Determining the appropriate rate of poultry manure for the growth of finger millet The negative changes due to mineral fertilizer usage calls for reviving the use of organic fertilizers such as poultry manure because poultry manure have been found to be richer in nitrogen than other livestock wastes Hirzel *et al*., (2007). Poultry manure alongside other organics serves as organic amendment of soils and as well provides crop nutrients with the findings of Sigh *et al*., (2004).

Materials and Methods

The above said agronomic field trial was done during *kharif* season of 2020 at the Crop Research Farm (CRF) situated at 25˚ 39' 42"N latitude, 81˚ 67' 56" E longitude and 98 m altitude above the mean sea level (MSL),Department of Agronomy, Naini Agricultural Institute, SHUATS, Prayagraj, Uttar Pradesh. For analysis, with the help of a soil auger from 0-15 cm of soil depth, soil samples were collected randomly. Soil samples were analysed in nearby KVK research station. Sandy loam was the soil type of the experimental area. Soil had available nitrogen (100.30 kg/ha), available phosphorus (31.78 kg/ha), available potassium (253.14 kg/ha), organic carbon (0.56%) and pH (6.7). In randomized block design (RBD) this experiment was done with nine treatments replicated three times. Each plot size for experiment was 3 × 3m. The treatment combination which were used for this experiment are T1: 20×10 cm + 2.0 t/ha poultry manure, T2: 20×10 cm + 2.5 t/ha poultry manure, T3: 20×10 cm + 3.0 t/ha poultry manure, T4: 30×10 cm + 2.0 t/ha poultry manure, T5: 30×10 cm + 2.5 t/ha poultry manure, T6: 30×10 cm +3.0 t/ha poultry manure, T7: 40×10 cm + 2.0 t/ha poultry manure, T8: 40× 10 cm + 2.5 t/ha poultry manure & T9: 40× 10cm + 3.0 t/ha poultry manure.

Observations of plant growth attributes, for all treatments were recorded by selecting five random plant from each plot. Similarly, to record observations on plant yield attributes five random plants were selecting from each plot at the time of harvest. Experimental data collected were subjected to statistical analysis by using Fisher's method of Analysis of Variance (ANOVA). Whenever the 'F' test was found significant at 5% level Critical Difference values were calcul.

Results and Discussion

Growth attributes

From Table: 1 Revealed that the effect of Row spacing and poultry manure on growth attributes of Finger Millet (*Eleusine coracana* L.). Plant height (cm), Leaf area (cm^2), Leaf area index, Number of tillers/plant (No.), Plant dry weight (g/plant), Crop growth rate (CGR) (g/m2 /day) and Relative growth rate (RGR) (g/g/day) come under growth attributes.

Plant height of Finger millet was significantly influenced among all treatments, highest (72.91cm) plant height was recorded with application of T6 (30×10 cm + 3.0 t/ha poultry manure) as compared to other treatment combinations.

In case of Leaf area of Finger millet was significantly influenced among all treatments, highest (526.37cm^2) leaf are was recorded with application of T6 (30×10 cm + 3.0 t/ha poultry manure) as compared to other treatment combinations. Whereas T3, T5 and T9 were statistically at par with T6.

In Leaf area index of Finger millet was significantly influenced among all treatments, highest (4.40) leaf area index was recorded with application of T6 (30×10 cm + 3.0 t/ha poultry manure) as compared to other treatment combinations. Whereas T9 was statistically at par with T6.

In number of tillers/plant of Finger millet was significantly influenced among all treatments, highest (7.20) number of tillers was recorded with application of T6 (30×10 cm + 3.0 t/ha poultry manure) as compared to other treatment combinations. Whereas T3 was statistically at par with T6.

In plant dry weight was significantly influenced highest value recording (14.27g) with application of T6 (30×10 cm + 3.0 t/ha poultry manure) as compared to other treatment combinations. Whereas T3 and T9 were statistically at par with T6.

In case of CGR and RGR highest data was found (0.396 g/m^2/day) and (0.044 g/g/day) respectively with application of T2 (20× 10 + 2.5 t/ha poultry manure) as compared to other treatment combinations.

The increase in plant height and dry matter could be due to application of poultry manure as it an important supplier of nitrogen and phosphorus. Increased cell number and elongation may have resulted in increased leaf area in finger millet which in turn contributed in increase of dry matter accumulation. Ashwini *et al*., (2006) and Eltilib *et al*. (2006). Wider spacing produced robust and healthy plants which is turn produced more number of leaves, higher number of tillers, increase in plant height due to less competition between plants for solar radiation light, space, water and increased the nutrient availability. Wider spacing and loosening of soil at right time which facilitate better rooting that helped in better absorption of water and nutrients. The result are similar to the findings of Bajpal *et al*., (2002), Daisy *et al*., (2013) and kalaraju *et al*., (2009).

Yield attributes

Table: 2 Revealed that the effect of Row spacing and poultry manure on yield attributes and yield of Finger Millet (*Eleusine coracana* L.). Yield attributes include the parameters like number of fingers /plant (No.), test weight (g), grain yield (t/ha), stover yield (t/ha), biological yield (t/ha) and Harvest index (%)

In case of Number of fingers/plant (6.07) was recorded significantly higher with application of T6 (30×10 cm + 3.0 t/ha poultry manure). Whereas T3 was statistically at par with T6.

Significantly highest 1000 seed weight was recorded (3.65g) with application of T6 (30×10 cm + 3.0 t/ha poultry manure). Whereas T3 and T9 were statistically at par with T6.

Grain yield of Finger millet shows significant differences in between the different treatment combinations. The highest (3.04 t/ha) value of grain yield was recorded with application of T6 (30×10 cm + 3.0 t/ha poultry manure).

In case of Stover yield, shows significant differences in between the different treatment combinations. The highest (6.58 t/ha) value of stover yield was recorded with application of T6 (30×10 cm + 3.0 t/ha poultry manure). Whereas T3 was statistically at par with T6.

In case of biological yield, shows significant differences in between the different treatment combinations. The highest (9.61 t/ha) value of biological yield was recorded with application of T6 (30×10 cm + 3.0 t/ha poultry manure).

In case of harvest index, there was no-significant differences in between the different treatment combinations. Highest value of harvest index (31.89%) was recorded with application of T6 (30×10 cm + 3.0 t/ha poultry manure).

Poultry manure incorporation in the soil helped in continuous

slow release of nutrients providing a better crop growth. Poultry manure produces more humic acid which form water soluble chelated phosphorus which helped in easy release of phosphorus to the crop which resulted in increased grain and straw yield as well as yield attributing characters with findings Prakash (2018) [12]. Poultry manure contains high nitrogen and various other nutrients and its addition as organic supplement enhances the nutrient availability resulting in increased yield attributes. The result are similar to the findings of Abdullahi *et al*., (2014), Govindppa *et al*.,(2009) and Sangeeth *et al*., (2010). 30×10 cm exhibited better yield attributing characters like more number of productive tillers and number of fingers probably due to more availability of space. Similar findings were also reported by Rajesh *et al*., (2011) in finger millet.

Economics of treatment

Economics evaluation of the treatments was done on the basis of gross return, net return and B:C ratio. In table: 3, maximum gross return (₹121600/ha), net return (₹ 84600 /ha) and B: C ratio (2.27) which were recorded with the application of T6 (30×10 cm + 3.0 t/ha poultry manure). This might be due to higher yield in this treatment compared to other treatment.

Table 1: Effect of Row Spacing and Poultry manure on growth parameters of finger millet (*Eleusine coracana L.*)

Treatment	Plant height (cm) 80 DAS	Dry weight (g/plant) 80 DAS	Number of tillers/plant 80 DAS	Leaf area (cm^2) 80 DAS	Leaf area index 80 DAS	CGR (g/m^2/day) 60-80 DAS	RGR (g/g/day) 60-80 DAS
20×10 cm+ 2.0t/ ha poultry manure	64.20	12.70	5.73	468.53	4.18	0.365	0.042
20×10 cm +2.5t /ha poultry manure	66.14	13.47	6.47	499.60	4.27	0.396	0.044
20×10 cm +3.0t /ha poultry manure	69.86	13.73	7.00	512.70	4.28	0.377	0.039
30×10 cm +2.0t/ ha poultry manure	66.67	13.43	6.33	507.97	4.25	0.388	0.043
30×10 cm+2.5t/ ha poultry manure	67.92	13.57	6.00	510.97	4.29	0.381	0.041
30×10 cm + 3.0t/ha poultry manure	72.91	14.27	7.20	526.37	4.40	0.355	0.034
40×10 cm + 2.0t/ ha poultry manure	62.80	11.97	6.13	456.53	4.12	0.350	0.044
40× 10 cm + 2.5t /ha poultry manure	65.23	12.87	6.20	487.67	4.17	0.368	0.042
40× 10cm +3.0t/ ha poultry manure	70.93	14.00	6.67	515.37	4.30	0.374	0.038
F test	S	S	S	S	S	NS	S
S.Em(±)	0.56	0.16	0.07	5.85	0.03	0.012	0.001
CD (p=0.05)	1.68	0.47	0.20	17.54	0.10	_	0.003

Table 2: Effect of Row Spacing and Poultry manure on yield attributes and yield of finger millet (*Eleusine coracana* L.)

Treatment	Number of fingers/plant	Test Weight (g)	Grain Yield (t/ha)	Biological Yield (t/ha)	Stover yield (t/ha)	Harvest Index (%)
20×10 cm+ 2.0t/ ha poultry manure	4.33	3.29	2.25	7.46	5.21	30.45
20×10 cm +2.5t /ha poultry manure	5.47	3.30	2.47	8.01	5.55	30.98
20×10 cm +3.0t /ha poultry manure	5.87	3.59	2.70	8.84	6.15	30.72
30×10 cm +2.0t/ ha poultry manure	5.33	3.25	2.40	7.82	5.42	30.94
30×10 cm+2.5t/ ha poultry Manure	4.67	3.25	2.28	7.97	5.69	28.70
30×10 cm + 3.0t/ha poultry manure	6.07	3.65	3.04	9.61	6.58	31.89
40×10 cm + 2.0t/ ha poultry manure	4.87	3.24	2.31	7.60	5.26	30.73
40× 10 cm + 2.5t /ha poultry manure	5.00	3.24	2.39	7.77	5.38	30.84
40× 10cm +3.0t/ ha poultry manure	5.67	3.53	2.59	8.34	5.75	31.15
F test	S	S	S	S	S	NS
S.Em(±)	0.11	0.05	0.05	0.19	0.17	0.67
CD (p=0.05)	0.34	0.14	0.16	0.56	0.51	-

Table 3: Effect of Row Spacing and Poultry manure on economics of finger millet (*Eleusine coracan* L.)

Treatment	Cost of cultivation (₹/ha)	Gross return (₹/ha)	Net return (₹/ha)	Benefit cost ratio
20×10 cm+ 2.0t/ ha poultry manure	34000	90000	56000.0	1.65
20×10 cm + 2.5t /ha poultry manure	35500	98800	63300.0	1.78
20×10 cm + 3.0t /ha poultry manure	37000	108000	71000.0	1.92
30×10 cm + 2.0t/ ha poultry manure	34000	96000	62000.0	1.82
30×10 cm+2.5t/ ha poultry manure	35500	91200	55700.0	1.57
30×10 cm + 3.0t/ha poultry manure	37000	121600	84600.0	2.27
40×10 cm + 2.0t/ ha poultry manure	34000	92400	58400.0	1.72
40× 10 cm + 2.5t /ha poultry manure	35500	95600	60100.0	1.69
40× 10 cm + 3.0t/ ha poultry manure	37000	100800	63800.0	1.72

Conclusion

From this experiment, it can be concluded that the appropriate row spacing 30×10 cm combination with 3.0 t/ha poultry manure was found to be superior with growth parameters, economics, yield and yield attributes of finger millet.

Reference

1. Bitew Yayeh, Asargew Fekremariam. Determination of Seed Rate and Inter Row Spacing for Finger Millet Production (*Eleusine Coracana*) in North Western Ethiopia 2014;1(4):1-7.

2. Chekole Nigus, Birhanu Melese. Effect of Inter Row Spacing and Seed Rate on Finger Millet (*Eleusine coracana* L.) Production in Merblekhe District – Ethiopia. American Journal of Research Communication 2018;6(8):1-10.
3. Damar WK, Garba A, Russom Z, Ibrahim SA, Haggai PT, Dikwahal. Effect of Poultry Manure on Growth and Yield of Finger Millet (*Eleusine Coracana* L.) 12(1):173-180.
4. Dereje Getahun, Anbessa Tigist Adisu Bekele. Influence of Row Spacing and Seed Rate on Yield and Yield Components of Finger Millet at Assosa Zone in Benshagul Gumuze Region of Ethiopia. Journal of Biology, Agriculture and Healthcare 2016;6(5):42-45.
5. Getahun Dereje, Tigist Adisu, Bekele Anbessa. Influence of Row Spacing and Seed Rate on Yield and Yield Components of Finger Millet at Assosa Zone in Benshagul Gumuze Region of IN Ethiopia. Journal of Biology, Agriculture and Healthcare 2016;6(5):2224-3208.
6. Jagadeesha N, Ravikumar B, Rathnakar M, Shet, Umesh MR, Reddy VC. Impact of different sources of organic nutrients on uptake, availability of nutrients, growth and yield of Finger Millet under rainfed condition. International Journal of Chemical Studies 2018;6(5):1598-1601.
7. Jagadeesha N, Reddy VC, Krishnamurthy N, Sheshadri T. Effect of organic manures on productivity of finger millet and redgram inter cropping system under protective irrigation. International Journal of Agricultural Sciences 2010;6(2):453-455.
8. Natarajan S, Ganapathy M, Arivazhagan K, Srinivasu V. Effect of spacing and nutrient sources on system of finger millet intensification. Indian Journal of Agronomy 2019;64(1):98-102.
9. Nouri Maman, Stephen Mason. Poultry manure and inorganic fertilizer to improve finger millet yield in Niger. African Journal of Poultry Farming 1(1):015-021.
10. Pallavi CH, Joseph B, Khan MA, Aariff, Hemalatha S. Effect of organic fertilizers and biofertilizers on yield and yield attributing traits of direct sown rainfed finger millet, *Eleusine coracana* (L) Gaertn. International Journal of Farm Science 2017;7(3):101-105.
11. Patel Himanshi H, Shroff Jagruti C. Growth, Yield and Economics of Finger millet [*Eleusine coracana* L.] as Influenced by Integrated Nutrient Management. International journal of microbial science 2020;7(11):724-729.
12. Prakasha G, Kalyana KN, Murthy AS, Prathima, Rohani N. Effect of Spacing and Nutrient Levels on Growth Attributes and Yield of Finger Millet (*Eleusine coracana* L.) Cultivated under Guni Planting Method in Red Sandy Loamy Soil of Karnataka, India. International journal of microbial science 2018;7(5):1337-1343.
13. Ramdev Togas, Yadav LR, Choudhary SL, Shisuvinahalli GV. Effect of Integrated Use of Fertilizer and Manures on Growth, Yield and Quality of Finger Millet. International journal of microbial science 2017;6(8):2510-2516.
14. Shinggu CP, Dadari SA, Shebayan JA, Adekpe DI, Mahadi MA, Mukhtar A *et al*. Influence of Spacing and Seed Rate on Weed Suppressionin Finger Millet (*Eleusinecarocana*). Journal of Scientific Research 2009;4(14):267-270.
15. Shinggu CP, Gani M. Effects of planting methods, sowing dates and spacing on weed and the productivity of finger millet (eleusine corocana L. gaertn) in the northern guinea savanna of nigeria. Global Journal Bio-Science Biotechnology 2012;1(2):160-162.
16. Yoseph Tekle. Determination of Inter Row Spacing and Seed Rate on Productivity of Finger Millet (*Eleusine Coracana L.),* At Jinka, Southern Ethiopia. International Journal of Research in Agricultural Sciences 2014;1(3):172-176.