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Influence of organic supplements on growth and yield of finger millet (*Eleusine Coracana* L.)

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Abstract
A field experiment was conducted at Agricultural College and Research Institute, Killikulam during *rabi* season (2019-2020) to study the impact of various solid and liquid organic supplements on growth and yield of transplanted finger millet (*Eleusine coracana* L.). The experiment was carried out in randomized block design replicated thrice with ten treatments. Treatments comprised of two solid organic supplements (100% FYM and 100% poultry manure) each in combination with three different liquid organic supplements (3% panchagavya, 3% jeevamrutham and 3% beejamrutham, respectively). All the treatments significantly influenced the growth characters, yield attributes and yield of transplanted finger millet over RDF and control. The higher growth and yield was significantly recorded with the application of 100% poultry manure + 3% panchagavya at 30 and 45 DAT. The least significant growth characters, yield attributes and grain yield were recorded in absolute control.

Keywords: Finger millet, FYM, poultry manure, panchagavya, growth, yield

Introduction
Finger millet (*Eleusine coracana* L.) is one among the foremost important millet grown for both grain and fodder purpose in India. Finger millet also called as ragi contains higher calcium content which was 10 times more than rice or wheat (Michaelraj and Shanmugam 2013) [7]. Finger millet was the third most millet next to sorghum and pearlmillet. In India, finger millet constitutes an area of 1.19 m ha with annual production of 1.98 m t and productivity of 1662 kg ha^{-1}. In Tamil Nadu, finger millet could be a prominent crop among small millets growing in a part of 0.86 L ha with 3.21 L t production and 3714 kg ha^{-1} productivity (INDIASTAT, 2018). Intensive cultivation, unbalanced and inadequate fertilizers with restricted use of organic manures have made soil deficient in nutrients and health. Therefore, organic farming is gaining importance which mainly involves the use of on-farm resources largely avoiding the utilization of chemical fertilizers. Liquid and solid manures having higher amount of beneficial microbes, macro and micro nutrients, essential amino acids, growth promoting substance like IAA, GA may greatly help in increasing soil microbial population and soil fertility further increasing the crop growth, yield and quality (Sreenivasa *et al.*, 2012) [10].

Organic farming practices are gaining importance as farmers realized benefits in terms of soil fertility, soil health and sustainable productivity. Most of the research on organic production of finger millet was applied with utilization of FYM, green manures, compost, neem cake, etc. Less number of researches was done on the effect of liquid organic manures like panchagavya, jeevamrutham, beejamrutham alone or together with solid organic manures in finger millet Organic liquid formulations like jeevamrutha and panchakavya helps for quik build up of soil fertility through enhanced activity of microflora and fauna (Deva Kumar *et al.*, 2008) [11]. These have the properties of both fertilizer and biopesticide and play a key role in promoting growth and immunity to the plant system. Any combination that reduce the dependence on chemical fertilizers and other resources can go an extended way in maintain the soil fertility as well as the financial conditions of the farming community. Hence, the experiment was carried out with an objective to find out the effect of solid and liquid organic supplements on growth and yield of transplanted finger millet.

Materials and Methods
The experiment was conducted during the rabi season (2019-2020) at Agricultural College and Research Institute, killikulam, Thoothukudi District. The experiment was laid out in randomized block design with ten treatments replicated thrice using two different organic manures (FYM and poultry manure) each in combination with three different liquid organic

manures (Jeevamrutham, Beejamrutham and panchagavya) as per the treatment schedule *viz*., 100% recommended dose of fertilizers (RDF) (60:30:30 NPK kg $ha^{-1)}$ (T_1), 100% FYM (T_2), 100% N through FYM + 3% Jeevamrutham foliar spray at 30 & 45 DAT (T_3), 100% N through FYM + 3% Beejamrutham foliar spray at 30 & 45 DAT (T_4), 100% N through FYM + 3% Panchagavya foliar spray at 30 & 45 DAT (T_5), 100% N through Poultry manure (PM) (T_6), 100% N through Poultry manure (PM) + 3% Jeevamrutham foliar spray at 30 & 45 DAT (T_7), 100% N through Poultry manure (PM) + 3% Beejamrutham foliar sprat at 30 & 45 DAT (T_8), 100% N through Poultry manure (PM) + 3% Panchagavya foliar spray at 30 & 45 DAT (T_9) and Absolute control (T_{10}). The finger millet variety Co (Ra) 15 variety was used with seed rate of 5 kg ha^{-1} with spacing of 30 x 10 cm. The seed bed was prepared for sowing and 20 days old healthy seedlings were transplanted in the main field. The FYM and poultry manures on N equivalent basis were applied as basal and foliar spray of liquid organic manures 3% beejamrutham, 3% jeevamrutham and 3% panchagavya were applied at 30 and 45 days after transplanting (DAT) as per the treatment schedule. The solid and liquid organic manures were collected from the college farm and nearby organic farms. The recommended dose of fertilizers (50% N, 100% P_2O_5 and 100% K_2O) was applied as basal for the treatment 100% RDF (T_1) and remaining 50% N was top dressed at 30 DAT. Observations on plant height, leaf area index, number of tillers $hill^{-1}$, dry matter production, number of productive tillers $hill^{-1}$, fingers $earhead^{-1}$, grains $earhead^{-1}$, finger length, grain and straw yield of finger millet were recorded.

Results and Discussion

Growth characters

Growth parameters, *viz*. plant height, leaf area index (LAI), number of tillers $hill^{-1}$ and dry matter production (DMP) were significantly influenced by the different combination of solid and liquid organic supplements (Table 1).

Significantly increased plant height, leaf area index, dry matter production and number of tillers $hill^{-1}$ were recorded with the application of 100% N through poultry manure in combination with foliar spray of panchagavya 3% at 30 and 45 days after transplanting (T_9) which was superior over rest of the treatment. It was followed by application of 100% N through poultry manure + 3% jeevamrutham spray at 30 & 45 DAT (T_7) and application of 100% N through poultry manure + 3% beejamrutham spray at 30 & 45 DAT (T_8) and they were on par with each other. The least growth characters were observed in absolute control (T_{10}). The increase in the plant height may be due to increased nitrogen availability with poultry manure incorporation in the soil which helped continuous slow release of nutrients providing a better crop growth. In addition, panchagavya foliar spray enhances the growth promoting substances which might helped in acceleration of plant height, leaf area index, number of tillers $hill^{-1}$ and dry matter production. Similar results were also observed with the findings of Abdullahi *et al.,* (2014) [1], Govindappa *et al.,* (2009) [4] and Sangeetha *et al.,* (2010) [9].

Yield attributes

Yield attributing characters, *viz*. number of productive tillers $hill^{-1}$, number of fingers $hill^{-1}$, number of grains $earhead^{-1}$, finger length were significantly influenced by different solid and foliar spray of liquid organics (Table 2). The test weight was not significantly influenced by the different organic supplements combination.

The trend fell in the same line as that of growth characters. Application of 100% N through poultry manure in combination with foliar spray of panchagavya (3%) at 30 and 45 DAT (T_9) significantly resulted in higher yield attributes, *viz*. number of productive tillers $hill^{-1}$, number of fingers $hill^{-1}$, number of grains $earhead^{-1}$ and finger length. It was followed by application of 100% N through poultry manure + 3% jeevamrutham spray at 30 & 45 DAT (T_7) which was on par with application of 100% N through poultry manure + 3% beejamrutham spray at 30 & 45 DAT (T_8) and found significantly superior over rest of the organic supplement combination treatments. The next best treatment was application of 100% FYM + 3% panchagavya spray at 30 & 45 DAT (T_5). This might be due to higher macro and micro nutrient content of the poultry manure which enables continuous slow and steady release of nutrients coupled with panchagavya foliar spray increased the nutrient uptake which might have helped in better tillering, finger length, grain filling, number of grains $earhead^{-1}$ (Priya and Sathyamoorthi, 2019). This ensured continuous availability of nutrients throughout the crop growth stages due to steady transformation, mineralization, solubilisation, decomposition of minerals and nutrients that might helped in ensuring superior yield attributing characters by organics. Similar findings were observed with Jagadeesha *et al.,* (2010) [6], Gawade *et al.,* (2013) [3], Ananda *et al.,* (2017) [2]. The lowest was observed in absolute control (T_{10}).

Yield

The grain and straw yield was very much influenced by different organic supplement treatment combinations (Table 3). Among the different organic supplement combinations, application of 100% N through poultry manure along with foliar spray of panchagavya (3%) at 30 and 45 DAT (T_9) significantly registered higher grain and straw yield followed by application of 100% N through poultry manure in combination with 3% jeevamrutham spray at 30 & 45 DAT (T_7) which maintained parity with that due to application of 100% N through poultry manure + 3% beejamrutham spray at 30 & 45 DAT (T_8) and found superior over application of 100% FYM + 3% panchagavya spray at 30 & 45 DAT (T_5). The lowest grain and straw yield was recorded in absolute control (T_{10}). Thousand grain weight was not significantly influenced by any of the treatment combinations. The increased grain and straw yield as well as yield attributing characters in respect to the application of organic supplements might be due to enhanced nutrient availability (Yogananda *et al.,* 2019) [11]. Since poultry manure and panchagavya contains high nitrogen and panchagavya contains high macro and micro nutrients and growth promoting substance which helped in increased yield attributes and yield (Vinoth Kumar and Velayutham, 2018). Moreover poulty manure produces more humic acid which form water soluble chelated phosphorus which helped in easy release of phosphorus to the crop. These results was also confirmed by Prakash (2018) [8].

Table 1: Influence of solid and liquid organic supplements on growth characters of transplanted finger millet

Treatments		Plant height	LAI	Number of tillers hill^{-1}	DMP (kg ha^{-1})
T_1	100% RDF	90.1	2.90	5.6	5608
T_2	100% FYM	84.1	2.23	4.4	5025
T_3	100% FYM+3% jeevamrutham FS at 30&45 DAT	96.0	3.40	6.3	5924
T_4	100% FYM+3% beejamrutham FS at 30&45 DAT	94.3	3.32	6.2	5858
T_5	100% FYM+3% panchagavya FS at 30&45 DAT	98.7	3.86	7.0	6185
T_6	100% poultry manure	87.0	2.61	5.0	5299
T_7	100% PM+3% jeevamrutham FS at 30&45 DAT	102.6	4.47	7.8	6619
T_8	100% PM+3% beejamrutham FS at 30&45 DAT	101.3	4.29	7.6	6512
T_9	100%PM+3% panchagavya FS at 30&45 DAT	105.2	4.87	8.4	6848
T_{10}	Absolute control	76.5	1.98	3.1	4690
	SEd	1.0	0.18	0.22	112
	CD (P=0.05)	2.2	0.37	0.47	226

Table 2: Influence of solid and liquid organic supplements on yield attributes of transplanted finger millet

Treatments		No. of productive tillers hill^{-1}	No. of fingers earhead^{-1}	No. of grains earhead^{-1}	Finger length (cm)
T_1	100% RDF	4.3	5.1	1174	7.5
T_2	100% FYM	3.5	4.0	910	6.5
T_3	100% FYM+3% jeevamrutham FS at 30&45 DAT	4.9	5.9	1397	8.2
T_4	100% FYM+3% beejamrutham FS at 30&45 DAT	4.8	5.7	1325	8.0
T_5	100% FYM+3% panchagavya FS at 30&45 DAT	5.4	6.4	1526	8.7
T_6	100% poultry manure	3.9	4.6	1045	7.0
T_7	100% PM+3% jeevamrutham FS at 30&45 DAT	6.0	7.0	1685	9.3
T_8	100% PM+3% beejamrutham FS at 30&45 DAT	5.8	6.9	1656	9.1
T_9	100%PM+3% panchagavya FS at 30&45 DAT	6.4	7.4	1838	9.8
T_{10}	Absolute control	1.2	3.2	768	5.1
	SEd	0.11	0.16	61	0.13
	CD (P=0.05)	0.23	0.35	125	0.29

Table 3: Influence of solid and liquid organic supplements on test weight and yield of transplanted finger millet

Treatments		1000 grain weight (g)	Grain yield (kg ha^{-1})	Straw yield (kg ha^{-1})
T_1	100% RDF	2.6	2087	3458
T_2	100% FYM	2.7	1798	3188
T_3	100% FYM+3% jeevamrutham FS at 30&45 DAT	2.7	2275	3686
T_4	100% FYM+3% beejamrutham FS at 30&45 DAT	2.8	2203	3617
T_5	100% FYM+3% panchagavya FS at 30&45 DAT	2.8	2392	3827
T_6	100% poultry manure	2.7	1924	3331
T_7	100% PM+3% jeevamrutham FS at 30&45 DAT	2.8	2535	4025
T_8	100% PM+3% beejamrutham FS at 30&45 DAT	2.8	2514	3950
T_9	100%PM+3% panchagavya FS at 30&45 DAT	2.7	2645	4165
T_{10}	Absolute control	2.6	1638	2735
	SEd	0.13	52	56
	CD (P=0.05)	NS	107	115

Conclusion

From this experiment, it can be concluded that that application of 100% poultry manure in combination with 3% panchagavya foliar spray at 30 and 45 DAT was found to be superior with respect to growth characters, yield attributes and yield of finger millet.

References

1. Abdullahi R, Sheriff HH, Buba A. Effect of biofertilizer and organic manure on growth and nutrients content of pearl millet. ARPN J Agric. Biolog. Sci. 2014; 9:351-355.
2. Ananda MR, Sharanappa, Kalyana Murthy KN. Response of Finger Millet under Organic Nutrient Management in Groundnut (*Arachis hypogaea* L.) – Finger Millet (Eleusine coracana L.) Cropping System. International Journal of Pure & Applied Bioscience. 2017; 5(5):200-206.
3. Gawade MB, Mahadkar UV, Jagtap DN. Effects of organic manures, sources and levels of fertilizers on yield attributes and yield of finger millet (*Eleusine coracana* G.). International Journal of Agricultural Sciences. 2013; 9(2):795-798.
4. Govindappa M, Vishwanath AP, Harsha KN, Thimmegowda P, Jnanesh AC. Response of finger millet (*Eluesine coracana* L.) to organic and inorganic sources of nutrients under rainfed condition. J Crop Weed. 2009; 5:291-293.
5. Indiastat, 2018. http://inidastat.org.
6. 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.
7. Michaelraj PSJ, Shanmugam A. A study on millets based cultivation and consumption in India Int J Market Financ Serv Manag Res. 2013; 2(4):49-58.
8. Prakash P. Effect of Establishment Methods and Sources of Organic Nutrients on Productivity and Nutrient Uptake of Finger Millet, (*Eleusine coracana* L.). International

Journal of Pure & Applied Bioscience. 2018; 6(3):437-442.
9. Sangeetha SP, Balakrishnan A, Bhuvaneswari J. Influence of organic nutrient sources on quality of rice. Madras Agricultural Journal. 2010; 97(7/9):230-233.
10. Sreenivasa MN, Nagaraj Naik, Bhat SN. Nutrient status and microbial load of different organic liquid manures. Karnataka Journal of Agricultural Sciences, 2012, 24(4).
11. Yogananda, SB, Devkumar N, Thimme Gowda P, Shruthi GK. Influence of bio-digester liquid and farmyard manure on growth and yield of rice (*Oryza sativa*) in Cauvery Command Area of Karnataka. Indian Journal of Agronomy. 2019; 64 (1):54-57.