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 pearl millet. 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 jeevamrutham, beejamrutham 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 (T₆), 100% FYM (T₅), 100% N through FYM + 3% Jeevamrutham foliar spray at 30 & 45 DAT (T₉), 100% N through FYM + 3% Beejamrutham foliar spray at 30 & 45 DAT (T₇), 100% N through Poultry manure (PM) (T₈), 100% N through Poultry manure (PM) + 3% Beejamrutham foliar spray at 30 & 45 DAT (T₇), 100% N through Poultry manure (PM) + 3% Jeevamrutham foliar spray at 30 & 45 DAT (T₉), 100% N through Poultry manure (PM) + 3% Beejamrutham foliar spray at 30 & 45 DAT (T₇), 100% N through Poultry manure + 3% Beejamrutham foliar spray at 30 & 45 DAT (T₉), 100% N through Poultry manure + 3% Panchagavya foliar spray at 30 & 45 DAT (T₉) and Absolute control (T₁₀).

The results 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 (T₆) 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 (T₇) and application of 100% N through poultry manure + 3% beejamrutham spray at 30 & 45 DAT (T₈) and they were on par with each other. The least growth characters were observed in absolute control (T₁₀). 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) [2] and Sangeetha et al., (2010) [3].

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 (T₉) 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 (T₇) which was on par with application of 100% N through poultry manure + 3% beejamrutham spray at 30 & 45 DAT (T₈) 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 (T₅).

The finger millet variety Co (Ra) 15 variety was used 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% P₂O₅ and 100% K₂O) was applied as basal for the treatment 100% RDF (T₁) 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.

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 (T₅) 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 (T₇) which maintained parity with that due to application of 100% N through poultry manure + 3% beejamrutham spray at 30 & 45 DAT (T₉) and found superior over application of 100% FYM + 3% panchagavya spray at 30 & 45 DAT (T₅). The lowest grain and straw yield was recorded in absolute control (T₁₀). 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 poultry 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].
Arachis hypogaea
Eleusine coracana
Eleusine coracana

References


