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Comparative efficacy of organic manures on growth of finger millet Var. VL Mandua 379

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Abstract

A field experiment was conducted at Himalayan University farm, Itanagar, Arunachal Pradesh, during the *kharif* season of 2023 with 8 treatments replicated thrice in randomized block design, to determine the effect of organic manures on growth of finger millet (*Eleusine coracana* L.). The experiment included the following treatments T₁- Control, T₂- Castor oilcake at 2.5 kg/ha+ Poultry manure at 2.5 kg/ha, T₃- Bone meal at 2.5 kg/ha + Poultry manure at 2.5 kg/ha, T₄- Mustard oilcake at 2.5 kg/ha + Goat manure at 2.5 kg/ha, T₅- Bone meal at 2.5 kg/ha + Neem oilcake at 2.5 kg/ha + Fym at 2.5 kg/ha, T₆- Neem oilcake at 2.5 kg/ha + Goat manure at 2.5 kg/ha, T₇- Mustard oilcake at 2.5 kg/ha + Poultry manure 2.5 kg/ha, and T₈- Bone meal at 2.5 kg/ha + Goat manure at 2.5 kg/ha.

The highest plant height recorded was 31.33 cm at 30 DAT, 77.26 cm at 60 DAT, 99.23 cm at 90 DAT, and 100.83 cm at harvest. The highest number of leaves per plant recorded was 25.15 at 30 DAT, 33.54 at 60 DAT, 37.83 at 90 DAT, and 31.66 at harvest. The highest number of tillers per plant recorded was 2.36 at 30 DAT, 2.86 at 60 DAT, 3.93 at 90 DAT, and 4.16 at harvest. In addition, plant dry weight recordings of 8.11 g plant⁻¹ at 30 DAT, 20.21 g plant⁻¹ at 27.89 g plant⁻¹ at 60 DAT, 40.74 g plant⁻¹ at 90 DAT, and 50.04 g plant⁻¹ at harvest were observed with treatment T₅ – Bone meal at 2.5 kg/ha + Neem oilcake 2.5 kg/ha + Fym at 2.5 kg/ha. Overall performance under treatment T₅ was better than rest of the treatments.

Keywords: Organic manures, growth, finger millet, *Eleusine coracana* L.

Introduction

Finger millet (*Eleusine coracana*) is the oldest food and first cereal grain used for domestic purpose. Cultivated Finger millet was domesticated about 5000 years ago from the wild was then also farmed in the lowlands of Africa. It is one of the oldest crops India is referred as “*nrtta-kondaka*” in the ancient Indian Sanskrit literature, which means “Dancing grain”, was also addressed as “*rajika*” or “*markatak*”. Earliest report of finger millet comes from Hallur in Karnataka of India dating approximately 2300 BC (Singh, 1991) ^[9]. 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, and beejamrutham alone or together with solid organic manures in finger millet organic liquid formulations like jeevamrutham and panchagavya helps for quick build-up of soil fertility through enhanced activity of micro flora and fauna.

Materials and Methods

The experiment was conducted during the *Kharif* season of 2023 at Himalayan University in Itanagar. The Crop Research Farm is located in Jollang on the university campus, situated at 27.14°N latitude and 93.62°E longitude, and an altitude of 320 meters above sea level. The site belongs to the Eastern Himalayan region, and the agro-climatic zone falls under the sub-tropical zone of Arunachal Pradesh. The growth parameters were calculated by following methods. Plant height (cm) from the ground level till the apex of the top leaf was noted at 30, 60, 90 DAT and at harvest, are expressed in cm.

Then number of leaves plant⁻¹ was recorded from the five selected tagged plants at 30, 60, 90 DAT and at harvest. The average number of leaves plant⁻¹ was worked out. The total number of tillers plant⁻¹ was counted from five hills at different growth stages and the average was worked out. After completion for dry weight

(g) the sample was collected from five randomly selected hills from the destructive sampling area was used to record the dry matter production. The plant was uprooted and its roots were removed. The aerial parts were chopped and put in a brown paper bag. Then it was dried in the thermostatically controlled oven at 60 °C till the sample was dried and constant weight was recorded

Table 1: Physio-chemical properties of soil in the experimental field, Himalayan University.

Sl. No	Particulars	Value
1.	Sand (%)	55.2%
2.	Silt (%)	24.5%
3.	Clay (%)	19.9 %
4.	Soil Texture	Sandy Loam
1.	Soil pH	4.25
2.	Organic carbon	1.59 %
3.	Electrical conductivity	0.452 dS/m
4.	Available Nitrogen	613.5 Kg/ha
5.	Available Phosphorus	4.86 Kg/ha
6.	Available Potassium	218.4 Kg/ha

Results and Discussions

At 30, 60, 90 DAT and at harvest in plant height was found to be statistically significant in treatment T₅ (Bone meal at 2.5 kg/ha+ Neem oilcake at 2.5 kg/ha+ Fym at 2.5 kg/ha) was found to be statistically at par with T₃ (Bone meal at 2.5 kg/ha+ Poultry manure at 2.5 kg/ha). The probable reason for recording higher plant height in T₅ (Bone meal at 2.5 kg/ha+ Neem oilcake at 2.5 kg/ha+ Fym at 2.5 kg/ha) is due to the application of Bone meal is rich source of phosphorus and calcium which improves the plant growth, whereas neem oilcake and fym are rich in plant nutrients, which results in higher plant height Srinivasan *et al.* (2020). There are scientific evident that limonoid content of neem oilcake and the double action of neem oilcake as natural fertilizer and pesticidal effect on insect and pest which result in the significantly higher tiller number in the treatment which receives (Bone meal at 2.5 kg/ha+ Neem oilcake at 2.5 kg/ha+ Fym at 2.5 kg/ha) i.e. T₅. Significantly higher plant leaves under the treatment T₅ (Bone meal at 2.5 kg/ha+ Neem oilcake at 2.5 kg/ha+ Fym at 2.5 kg/ha) is due to the integration of Bone meal, neem oilcake and fym. Higher dry matter accumulation under treatment T₅ (Bone Meal at 2.5 kg/ha + Neem Oilcake at 2.5 kg/ha + FYM at 2.5 kg/ha) is due to the application of Neem cake as neem cake reduced the loss of nutrients from the soil, whereas bone meal and fym are rich in plants nutrients that enhance the fertility of the soil. It result plant to grow profusely, rapid initiation of leaves and their expansion ultimately resulted in high rate of photosynthesis besides higher dry matter accumulation of the individual plants. A sigmoidal but marginal decrease in RGR was found during the successive growth intervals it may be due to application of various organic manures, as they are rich in plant nutrient which improves the fertility and enhance physiological, metabolic processes and overall growth and development of the plant. Higher rate of

CGR in T₅ (Bone meal at 2.5 kg/ha+ Neem oilcake at 2.5 kg/ha+ Fym at 2.5 kg/ha) due to the application of neem oilcake as neem cake reduce nutrients loss from soil and increase soil fertility, whereas bone meal and fym are rich in plant nutrient that enhance the overall growth and developments of the plants Basavaraj (2017) ^[2]. The treatment under T₁ (Control) were found least values in every growth parameters, it may be due to no application of any fertilizer.

Table 2: Influence of organic manures on plant height (cm) of finger millet.

Treatments	Plant height (cm)			
	30 DAT	60 DAT	90 DAT	Harvest
T ₁	21.23	45.2	62	64.23
T ₂	30	72.93	94	97.26
T ₃	30.60	76	98	99.43
T ₄	28.53	67	88	92.60
T ₅	31.33	77.26	99.23	100.83
T ₆	30.23	73.93	96.36	98.46
T ₇	29.6	70.6	91.83	96.4
T ₈	27.6	66.3	85.33	88.73
F Test	NS	S	S	S
SEd (±)	0.20	0.74	0.95	0.52
CD (P=0.05)	0.43	1.59	2.04	1.11

Table 3: Influence of organic manures on number of leaves plant⁻¹ of finger millet

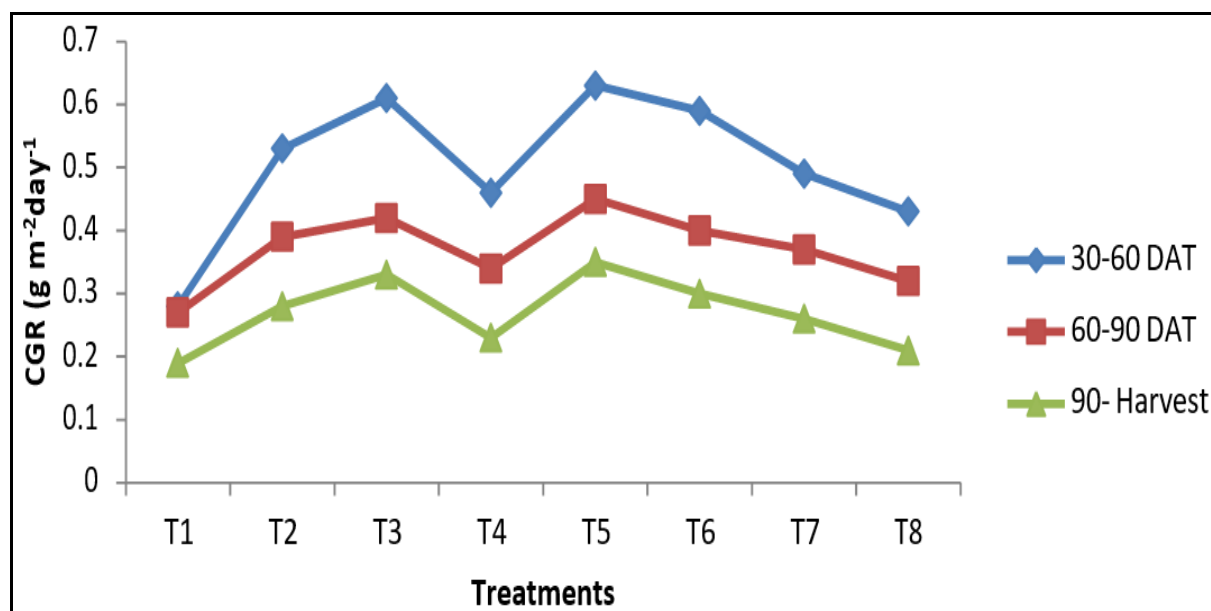
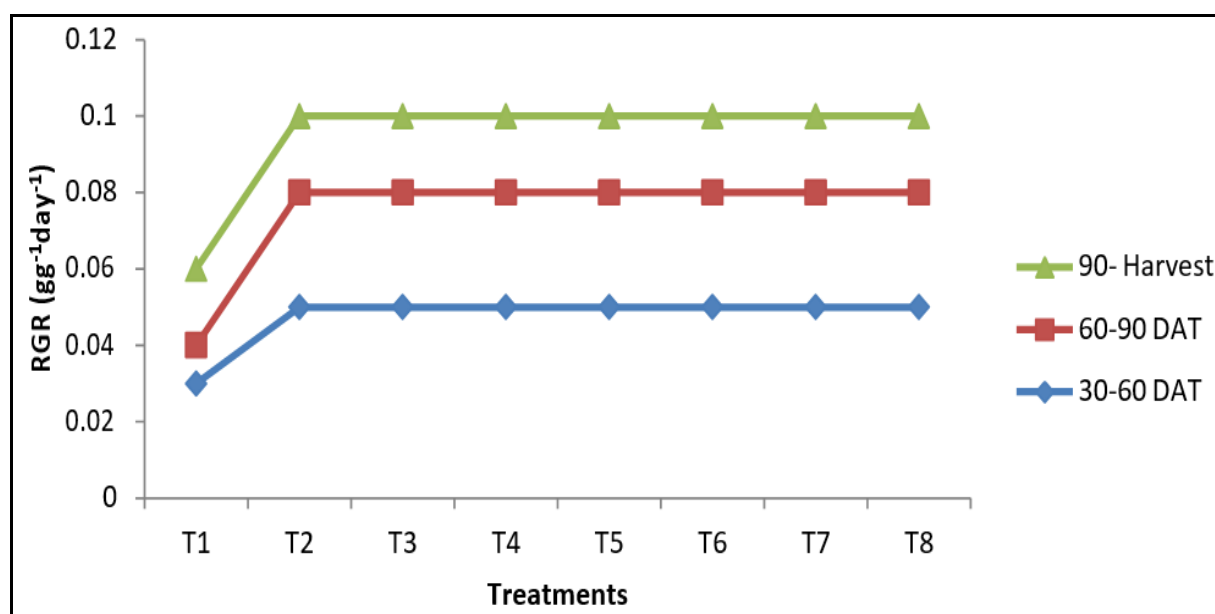
Treatments	Number of leaves plant-1			
	30 DAT	60 DAT	90 DAT	Harvest
T ₁	12.66	14.61	18.76	15.52
T ₂	20.53	30.73	33.53	26.36
T ₃	24.23	32.5	36.71	29.73
T ₄	18.46	28.23	29.33	21.93
T ₅	25.15	33.54	37.83	31.66
T ₆	22.73	31.46	35.46	28.76
T ₇	19.76	30.15	32.56	24.53
T ₈	17.51	24.73	26.26	20.53
F Test	NS	S	S	S
SEd (±)	0.31	0.37	0.22	0.36
CD (P=0.05)	0.66	0.79	0.47	0.78

Table 4: Influence of organic manures on number of tillers plant⁻¹ of finger millet

Treatments	number of tillers plant-1			
	30 DAT	60 DAT	90 DAT	Harvest
T ₁	1.32	1.74	2.53	2.71
T ₂	1.73	2.44	3.36	3.53
T ₃	2.25	2.73	3.77	3.86
T ₄	1.53	2.26	2.91	3.28
T ₅	2.36	2.86	3.93	4.16
T ₆	1.86	2.53	3.56	3.73
T ₇	1.67	2.36	3.23	3.36
T ₈	1.46	2.28	2.76	3.16
F Test	NS	S	S	S
SEd (±)	0.05	0.04	0.06	0.05
CD (P=0.05)	0.12	0.09	0.13	0.11

Table 5: Influence of organic manures on dry weight (g) of finger millet

Treatments	Dry Weight (g)			
	30 DAT	60 DAT	90 DAT	Harvest
T ₁	3.75	12.13	21.59	30.64
T ₂	6.54	23.72	36.01	44.36
T ₃	7.17	26.25	39.34	48.32
T ₄	5.62	20.21	33.27	38.70
T ₅	8.11	27.89	40.74	50.05
T ₆	6.71	24.12	37.28	45.09
T ₇	6.22	22.31	34.11	43.06
T ₈	5.52	19.18	32.27	37.67
F Test	NS	S	S	S
SEd (\pm)	0.35	0.45	1.08	2.19
CD (P=0.05)	0.76	0.96	2.33	4.71

**Fig 1:** Influence of organic manures on crop growth rate (g m⁻² day⁻¹) of finger millet at different intervals.**Fig 2:** Influence of organic manures on relative growth rate (g g⁻¹ day⁻¹) of finger millet at different intervals.

Conclusion

Considering the salient findings in perspective, the study revealed that the treatments with the combinations of Bone meal at 2.5 kg/ha + Neem oilcake at 2.5 kg/ha + Fym at 2.5 kg/ha (T₅) was found to be best combination for maximizing growth

parameters (plant height, number of leaves, number of tillers, dry weight) of the finger millet. It is observed that the rate of CGR and RGR were also best in the treatment with the combination of Bone meal at 2.5 kg/ha + Neem oilcake at 2.5 kg/ha + Fym at 2.5 kg/ha (T₅).

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