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EFFECT OF COIR PITH COMPOST, BONE MEAL POWDER AND PANCHAGAVYA ON YIELD ATTRIBUTES, YIELD AND HARVEST INDEX OF BARNYARD MILLET cv. CO_2 IN SANDY LOAM SOIL

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ABSTRACT

A pot experiment was conducted at the Department of SS & AC, Annamalai University during February-May, 2019 to find out the effect of different organic nutrient sources on yield attributes and yield of barnyard millet (*Echinochloa frumentacea* (Roxb.) Link). Millets are still the principal sources of energy, protein, vitamins and minerals for millions of poorest people. Coir pith has been found to an effective substitute for natural peat. Bone meal is a mixture of finely and coarsely ground animal bones and slaughter-house waste products. Panchagavya is an organic formulation with a blend of five products obtained from cow i.e. milk, ghee, curd, dung and urine. The treatments of the experiment were : T_1– Control, T_2 –100% RDF, T_3 – Coir pith compost @ 10 t ha^{-1}, T_4 – Bone meal powder @ 1 t ha^{-1}, T_5 – Panchagavya @ 3 % (Foliar spray), T_6 –T_3 + T_4, T_7 – T_4 + T_5, T_8 – T_3 + T_5 and T_9 – T_3 + T_4 + T_5. The design of the experiment was completely randomized design (CRD). Among the treatments, application of 100 % RDF (N: P_2O_5: K_2O @ 40:30:50 kg ha^{-1}) (T_2) recorded the highest number of productive tillers pot^{-1} of 6.54, ear head $plant^{-1}$ (4.50), ear head length of 10.11, ear head weight of 30.37 g. grain yield of 166.15 g and straw yield of 306.15 g pot^{-1}. The treatment T_2 was on par with T_9.

Keywords: barnyard millet (*Echinochloa frumentacea* ,coir pith compost, bone meal powder, panchagavya

INTRODUCTION

Among all the millets, barnyard millet *(Echinochloa frumentacaea* (Roxb.)Link) is hardly and vigorous growing nature can be grown in drought and water logging condition (Raundal *et al.,* 2017). Incorporation of fully decomposed coir pith @ 12.5 t ha^{-1} two days before transplanting significantly increased plant height, number of tillers $plant^{-1}$, panicle length and grain per panicle. (Thilagavathi and Mathan (1995). Organic liquid formulations like panchagavya helps for quick buildup of soil fertility through enhanced activity of soil micro flora and fauna (Devakumar *et al.,* 2008). It has the properties of both fertilizer and bio-pesticide and play a key role in promoting growth and immunity to the plant system. Bone meal powder protects plants under adverse weather conditions. It also helps plant to attain maturity quickly. This present investigation aimed to evaluate the effect of integrated organic nutrient sources on yield attributes and yield of barnyard millet.

MATERIALS AND METHODS

A pot experiment was conducted at the Department of Soil Science and Agricultural Chemistry, Faculty of Agriculture, Annamalai University during February-May, 2019 to find out the effect of different organic nutrient sources on yield attributes and yield of barnyard millet (*Echinochloa frumentacea* (Roxb.) Link). The soil used in this study belongs to yellowish red to red colour, Alfisols in order and the taxonomic classification of *Typic Rhodustalfs*. The treatments of the experiment were : T_1– Control, T_2 –100% RDF, T_3 – Coir pith compost @ 10 t ha^{-1}, T_4 – Bone meal powder @ 1 t ha^{-1}, T_5 – Panchagavya @ 3 % (Foliar spray), T_6 –T_3 + T_4, T_7 – T_4 + T_5, T_8 – T_3 + T_5 and T_9 – T_3 + T_4 + T_5. The design of the experiment was completely randomized design (CRD). The recommended dose of N, P_2O_5 and K_2O for barnyard millet is 40:30:50 kg ha^{-1}. The calculated quantity of NPK fertilizers were applied for the particular treatment on dry weight basis. Nitrogen was applied in two splits *viz.,* first half as basal and remaining half at 30 days after sowing. The entire dose of P and K were applied as basal . The required quantities of N, P_2O_5 and K_2O were supplied through urea, super phosphate and muriate of potash, respectively. The organic nutrient sources *viz.,* coir pith compost and bone meal were applied @ 10 and 1.0 t ha^{-1}, respectively to the respective treatment. Panchagavya applied as per the treatment as seed treatment, seedling treatment and foliar spray @ 3%. The pots were irrigated regularly as and when required to maintain moisture at field capacity. The crop was grown up to maturity with proper cultural practices. The yield attributes and yield were recorded.

RESULTS AND DISCUSSION

The data pertaining to number productive tillers $plant^{-1}$, number of earhead $plant^{-1}$, earhead length, earhead weight and 1000 grain weight due to different treatments are presented in table 1.

Number of productive tillers pot^{-1}

Treatment details	Yield attributes				
	Number of productive tillers pot-1	Number of ear heads plant-1	ear head length (cm)	ear head weight (g)	1000 grain weight (g)
T_1 – Control	2.37	2.69	7.42	14.87	2.80
T_2 – 100% RDF	6.54	4.50	10.11	31.06	3.11
T_3 – Coir pith compost @ 10 t ha^{-1}	3.63	3.30	8.27	20.14	2.92
T_4 – Bone meal powder @ 1 t ha^{-1}	2.96	2.97	7.83	17.23	2.86
T_5 – Panchagavya @ 3% (F.S)	3.59	3.23	8.19	19.54	2.90
T_6 – T_3+T_4	4.42	3.67	8.74	25.06	2.97
T_7 – T_4 + T_5	4.39	3.60	8.62	23.88	2.95
T_8 – T_3 + T_5	5.07	3.92	9.46	27.74	3.00
T_9 – T_3+T_4+ T_5	6.19	4.38	9.97	30.37	3.07
S.Ed	0.26	0.09	0.20	0.70	0.09
CD (P = 0.05)	0.53	0.19	0.40	1.40	NS

Table 1: Effect of coir pith compost, bone meal powder and panchagavya on number of productive tillers $plant^{-1}$, ear head weight, ear head length and 1000 grain weight of barnyard millet cv. CO_2 in the pot-culture experiment

Treatment details	Yield		
	Grain yield(g pot^{-1})	Straw yield (g pot^{-1})	Harvest Index
T_1– Control	62.05	106.85	36.73
T_2 – 100% RDF	166.15	306.15	35.17
T_3 – Coir pith compost @ 10 t ha^{-1}	94.00	167.25	40.87
T_4 – Bone meal powder @ 1 t ha^{-1}	77.65	135.95	36.35
T_5 – Panchagavya @ 3% (Foliar Spray)	93.35	165.35	36.08
T_6 – T_3+T_4	117.05	231.90	33.54
T_7 – T_4 + T_5	113.95	212.45	34.19
T_8 – T_3 + T_5	144.00	270.90	34.70
T_9 – T_3+T_4+ T_5	163.69	301.10	35.18
S.Ed	7.18	13.60	
CD (P = 0.05)	14.36	27.21	

Table 2: Effect of coir pith compost, bone meal powder and panchagavya on grain yield, straw yield and harvest index of barnyard millet cv. CO_2 in the pot-culture experiment

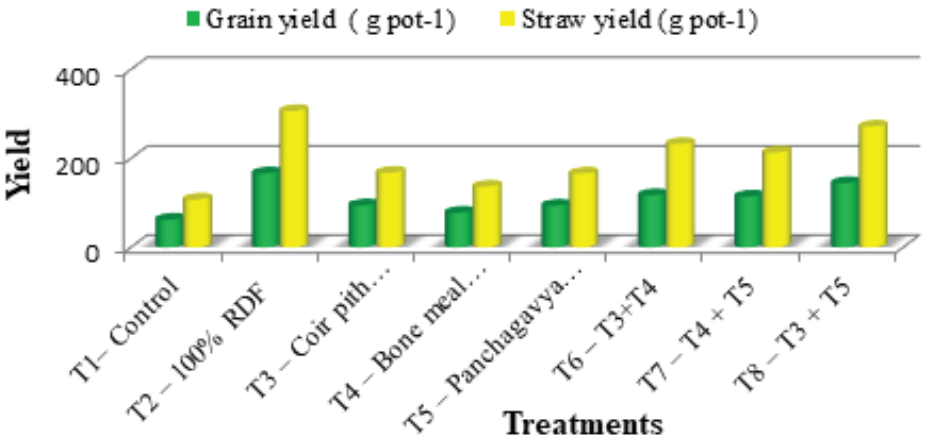

Fig 1: Barnyard millet yield as influenced by coir pith compost, bone meal powder and panchagavya

Application of 100 % RDF (N: P_2O_5: K_2O @ 40:30:50 kg ha^{-1}) (T_2) recorded the highest number of productive tillers pot^{-1} of 6.54 was significant with combined application of coir pith compost, bone meal powder and panchagavya registered 6.19. This was followed by 5.07 found to be with application of coir pith compost and panchagavya (T_8). The lowest number of productive tillers pot^{-1} of 2.37 was observed under control treatment that received no organic manures and inorganic fertilizers. This

might be attributed to adequate supply of macro nutrients to the cop from applied NPK fertilizers, which in turn increased photosynthetic activity of plant and helped to develop extensive root system. This would have helped the plant to extract more nutrients from soil resulting in better development of yield attributes (Krishnaprabu, 2002).

Number of ear head plant^{-1}

The higher number of ear head plant^{-1} (4.50) was registered due to application of 100 % RDF (N: P_2O_5: K_2O @ 40:30:50 kg ha^{-1}) (T_2). It was on par with combined application of coir pith compost, bone meal powder and panchagavya (T_9) registered 4.38. Application of coir pith compost (T_3), bone meal powder (T_4) and panchagavya (T_5) registered the number of ear head plant^{-1} were 3.30, 2.97 and 3.23, respectively. However, control treatment (T_1) recorded the lower number of earhead plant^{-1} of 2.69.

Ear head length (cm)

Ear head length differed significantly due to the application of different combinations of organic manures and inorganic fertilizers. Among the various treatments, T_2 – 100% RDF registered the highest ear head length of 10.11cm than control recorded the lowest ear head length of 7.42cm. The treatment T_2 was on par with T_9 – CPC+BMP+PG recorded the ear head length of 9.97 cm. This was due to the excellent utilization of growth resources in sufficient or requisite amount resulted in better availability of plant nutrients and their translocation to sink components like productive tillers, finger length and weight of grains. These results corroborate with the findings of Jagathjothi *et al.,* (2010).

Ear head weight (g)

The combined application coir pith compost, bone meal powder and panchagavya (T_9) registered the ear head weight of 30.37 g. Application of coir pith compost (T_3), bone meal powder (T_4) and panchagavya (T_5) registered the ear head weight of 20.14, 17.23 and 19.54 g, respectively. The treatment T_3 was on par with T_5. The highest ear head weight of 31.06 was found to be with application of application of 100 % RDF (N: P_2O_5: K_2O @ 40:30:50 kg ha^{-1}) (T_2) than control (T_1) (14.87 g). This might be due to higher nutrient availability from coir pith compost, bone meal and panchagavya, which facilitated better ear head weight in plant (Rameshwar Singh and Totawat, 2002).

1000 grain weight (g)

There was a non-significant difference noticed in 1000 grain weight of barnyard millet with different treatments. Among the treatments, application of 100 % RDF (N: P_2O_5: K_2O @ 40:30:50 kg ha^{-1}) (T_2) recorded the 1000 grain weight of (3.11 g) than control (T_1) (2.80 g). Application of coir pith compost (T_3), bone meal powder (T_4) and panchagavya (T_5) registered 1000 grain weight of 2.92, 2.86 and 2.90 g, respectively. The combined application of coir pith compost and bone meal powder (T_6), bone meal powder and panchagavya (T_7) and coir pith compost and panchagavya (T_8) registered the 1000 grain weight of 2.97, 2.95 and 3.00 g, respectively. Similar result was reported by Singh and Chauhan (2016) in pearl millet.

YIELD

Grain yield (g pot^{-1})

The grain and straw yield of barnyard millet differed significantly with different treatments are presented in table 2. The treatment which received 100 % RDF (N: P_2O_5: K_2O @ 40:30:50 kg ha^{-1}) (T_2) recorded the grain yield of 166.15 g pot^{-1} was on par with combined application of CPC+BMP+PG registered 163.69 g pot^{-1}. Application of CPC + BMP (T_6), BMP+PG (T_7) and CPC + PG (T_8) registered the grain yield of 117.05, 113.95 and 144.00 g pot^{-1}, respectively. Among the treatments, T_2 was on par with T_9 similarly T_6 was on par with T_7. However, the lowest grain yield (62.05 g pot^{-1}) was noticed in T_1 which received no organic sources and inorganic fertilizers. The increase in grain yield due to this treatment could be assigned to the cumulative ameliorating effect of yield parameters. These findings of corroborate with the work of Ali *et al*., (2012).

Straw yield (g pot^{-1})

The highest straw yield of 306.15 g pot^{-1} was registered in T_2, which received 100 % RDF (N: P_2O_5: K_2O @ 40:30:50 kg ha^{-1}). It was significantly superior over other treatments and on par with combined application of coir pith compost, bone meal powder and panchagavya (T_9) (301.10 g pot^{-1}). It was followed by 270.90, 212.45, 231.90 and 167.25 g pot^{-1} was found to be with T_8, T_7, T_6 and T_3, respectively. However, the lowest straw yield of 106.85 g pot^{-1} was observed in control (T_1) which received no organic sources and inorganic fertilizers. This is conformity with the findings of Govindappa *et al.,* (2009) that application of recommended dose of fertilizer (N: P_2O_5: K_2O @ 50:40:25 kg ha^{-1}) for higher straw yield in finger millet grown under rainfed condition.

Harvest index (HI)

The different treatments exhibited significant influence on harvest index. Among the treatment's application of 100 % RDF (N: P_2O_5: K_2O @ 40:30:50 kg ha^{-1}) registered the harvest index of 35.17. The combined application of coir pith compost, bone meal powder and panchagavya (T_9) recorded the harvest index of 35.18. This was also due to higher nutrient

CONCLUSION

The present study clearly indicates that highest yield attributes and yield of barnyard millet were recorded with T_2. This was on par with coir pith compost, bone meal powder and panchagavya (T_9) and the lowest values were found to be with control (T_1).

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