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The Effect of Paddy and Coffee Husk as the Organic Manure on the Vegetative and Yield Parameters of Moth Bean [*Vigna aconitifolia* (Jacq) Marechal]

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ABSTRACT

Background: Amidst of emerging world with the new technologies we are in the dangerous condition regarding the disposal of agro industrial wastes which creates a serious problem. Organic manures can prevent and can enhance the productivity in the plants as well as can reduce the environmental issues.

Methods: The study was conducted in the month of September to November 2019 at St. Joseph's College Campus, Visakhapatnam, A.P. with the bio composting process of paddy and coffee husk along with *Pleurotus eous, Pleurotus florida, Trichoderma asperelloides* and *Eisenia fetida*, with 6 treatments. The plants were analyzed for root length, shoot length, number of leaves, number of nodules, fresh weight and dry weight of the plant on 20, 40 and 60 DAS and the yield parameters were analyzed on 90th day of the plant.

Result: The results showed a great increase in the treatment 6 (Pre decomposed coffee husk, consortium of *Pleurotus eous, P. florida, Trichoderma asperelloides* and *Eisenia fetida*) in root length (8.5, 12.9 and 16.1 cm) shoot length (15.2, 30.3 and 43.2 cm) number of leaves (11, 18 and 49) number of nodules (12, 20 and 9) fresh weight (4.83, 8.98 and 15.47 g) and dry weight (1.11, 3.56 and 4.37 g) when compared with the other treatments and control. The yield parameters also showed significant results in number of pods (27), length of the pod (5.7 cm), number of seeds/pod (6), weight of the seeds/pod (2.89 g), fresh weight of the pod (1.653 g) and dry weight of the pod (0.986 g).

Key words: *Eisenia fetida*, Mothbean, Organic manure, *Pleurotus eous, Pleurotus florida, Trichoderma asperelloides*.

INTRODUCTION

Over the past century the attention is given to the agricultural science specially as a response to the excess growth of the global population, particularly the issues like food, crop and security and the technological advances resulting the many emerging issues and challenges to the future generations and among them the important challenge is the disposal of agro industrial wastes which is also a great hazard with its unorganized deposition which can cause environmental issues like pollution, landfills, eutrophication, economic loses, health risks and also climate changes by releasing harmful greenhouse gases (Khuriyati and Kumalasari, 2015).

Every year nearly 20 million tons of paddy is produced, which results in generating nearly 24 million tons of paddy straw and husk. If these are burnt then 4.4 million tons of paddyash is produced, which could be used in brick industry, steel and cement (Giddel and Jivani, 2007).

In India there are different commercial crops one of the important among them is coffee and it is the export crop which alone fetches a considerable and desirable foreign exchange to various countries. In India the southern states of Karnataka (71%), Kerala (21%) and Tamil Nadu (5%) overall produce 8,200 tons (Velmourougane *et al*., 2010). According to the statistical data coffee productivity in India from financial year 2013 to 2020 by state shows Karnataka has taken the 1st place in producing the coffee and it is followed by Kerala, Tamil Nadu, Andhra Pradesh and Odissa. The coffee plantations, coffee pulp and seed husk are formal to be more hazardous and major solid water which are gained during its processing about 1 ton of husk is generated during its dry processing since this is lingo cellulosic waste and it as hazardous (Aranda and Barois, 2000).

Use of paddy husk and coffee husk which is fibrous in nature and also they are fatal to cattle feeding and filling up of the land with these wastes is more hazardous to the environment and is wrong way of disposing of the waste. Moth bean is one of the most drought resistant crop grows in semi arid and arid regions of Gujarat, Karnataka, Rajasthan, Maharashtra and Haryana and its yield is much

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less as compared to other legume crops, hence it is necessary to enhance the production specially by applying organic manure, biofertilizer and micronutrients in various combinations as the need is increasing to reduce the usage of chemical fertilizer and increase the use of organic fertilizer to improve the physico-chemical as well as the soil fertility the supply of the nutrients in the plant (Sipai *et al.,* 2018).

MATERIALS AND METHODS

Pot culture study of moth bean

The experimental pot was filled with 7 kgs of red sandy loam soil and control also was maintained. The seeds of *Vigna aconitifolia* (Jacq) Marechal were obtained from Jaipur Rajasthan Agriculture institute. Viable seeds were used for pot culture studies with 3 replications of each treatment and it was conducted during September-November 2019 at St. Joseph's college campus, Visakhapatnam, A.P. at the latitude 17.719185 and longitude 83.286938.

The treatments are as follows:

C - Control.

T_1- Pre decomposed paddy husk, *Pleurotus eous* and *Eisenia fetida* (5 t/ha).

T_2- Pre decomposed paddy husk, *Pleurotus florida* and *Eisenia fetida* (5 t/ha).

T_3- Pre decomposed paddy husk, consortium of *Pleurotus eous, Pleurotus florida,Trichoderma asperelloides* and *Eisenia fetida* (5 t/ha).

T_4- Pre decomposed coffee husk, *Pleurotus eous* and *Eisenia fetida* (5t/ha).

T_5- Pre decomposed coffee husk, *Pleurotus florida* and *Eisenia fetida* (5 t/ha).

T_6- Pre decomposed coffee husk, Consortium of *Pleurotus eous, P. florida,Trichoderma asperelloides* and *Eisenia fetida* (5 t/ha).

Vegetative parameters such as shoot length, root length, number of leaves, number of nodules, fresh weight and dry weight on 20, 40 and 60 days after sowing (DAS) and on 90th day yield parameters of the plant such as number of pods/plant, length of the pod, number of seeds/pod, weight of the seeds/pod, pod fresh weight and pod dry weight were evaluated and the inference was subjected to statistical analysis of one way and two way ANOVA with the software Sigma stat 3.1.

RESULTS AND DISCUSSION

The effect of paddy and coffee husk as the organic manure on the vegetative parameters of moth bean [*Vigna aconitifolia* (Jacq) marechal]

The present study shows the influence of the agro industrial wastes paddy and coffee husks and its effect on the

Table 1: Effect of paddy and coffee husk as organic manure on the vegetative parameters of moth bean on 20, 40 and 60 DAS.

Treatments	Root length (cm)			Shoot length (cm)		
	20 DAS	40 DAS	60 DAS	20 DAS	40 DAS	60 DAS
C	3.9	9.7	12.4	9.2	19.5	27.2
T1	5.5	10.5	13.2	13.1	22.1	33.4
T2	6.2	11.3	14.1	11.9	24.4	32.9
T3	7.1	12.2	15.8	14.9	29.2	41
T4	4.7	11.4	14.6	14.3	20.9	34.1
T5	5.8	11.9	15	13.7	23.9	40.2
T6	8.5	12.9	16.1	15.2	30.3	43.2
SEd		0.34365			0.39561	
CD (p<0.05)		0.69368**			0.79856**	

**Significant at (p<0.05); DAS - Days after sowing.

Table 2: Vegetative parameters of moth bean with the influence of paddy and coffee husk as the organic manure.

Treatments	Number of leaves (cm)			Number of nodules		
	20 DAS	40 DAS	60 DAS	20 DAS	40 DAS	60 DAS
C	7	11	21	5	10	3
T1	8	13	26	7	13	5
T2	8	12	24	8	16	6
T3	9	16	45	10	19	8
T4	7	13	25	8	15	5
T5	8	12	27	9	14	7
T6	11	18	49	12	20	9
SEd		0.40053			0.44186	
CD (p<0.05)		0.80849**			0.89191**	

**Significant at (p<0.05); DAS - Days after sowing.

vegetative growth and yield parameters of moth bean (*Vigna aconitifolia*(Jacq) Marechal) the results are as shown in Table (1-4).

Root length was observed during 20, 40 and 60 DAS and it is found to be high in treatment 6 (Pre decomposed Coffee husk, consortium of *Pleurotus eous, P.florida, Trichoderma asperelloides* and *Eisenia fetida* (8.5,12.9 and 16.1 cm) among all the treatments and it is followed by the treatment 3 (Pre decomposed paddy husk, consortium of *Pleurotus eous, P. florida,Trichoderma asperelloides* and *Eisenia fetida*.) (7.1, 12.2 and 15.8 cm) when compared to control (3.9, 9.7 and 12.4 cm).

Significantly the increased growth of the Shoot length also observed in Treatment 6 (15.2, 30.3 and 43.2 cm) followed by treatment 3 (14.9, 29.2 and 41.0 cm) compared to control (9.2, 19.5 and 27.2 cm). A marvelous improvement in number of leaves was observed in treatment 6 (11, 18 and 49) (Table 2) when compared to treatment 3 (9, 16 and 45) and control (7, 11 and 21).

Number of nodules as it is showed in Table 2 there was increase in 20 DAS to 40 DAS later there is decreasing trend found at 60 DAS and the highest number of nodules obtained in treatment 6 (12, 20 and 9) followed by treatment 3 (10, 19 and 8) compared to control (5, 10 and 3).

Fresh weight and dry weight

According to Table 3 the maximum fresh weight (4.83,8.98 and 15.47 g) and dry weight (1.11, 3.56 and 4.37 g) of test crop was found in treatment 6 and it is followed by treatment 3 (4.11,7.99 and 14.97 g) (0.99, 3.32 and 4.19 g) compared to the control (2.97,6.02 and 10.79 g), (0.45,2.14 and 3.09 g). The present study is in par with the results of Raihing and Vijayalakshmi, (2021) where the effect of fruit and vegetable vermicompost on lablab (*Lablab purpureus* (L) Sweet) showed the highest shoot length in T8 Treatment (113.7, 124.5 and 135 cm) on 15, 35 and 55 days after sowing (DAS).

Manivannan *et al.* (2009) found in *Phaseolus vulgaris*, when applied with vermicompost and NPK gave good results in growth parameters such as root length (22.5 cm) shoot length (69.1 cm) and number of nodules (39).

According to Harireddy and Joy Dawson, (2021) during harvest time the vermicompost application (6 t/ha) with *Rhizobium* and *Azospirillum* has resulted in the maximum growth of plant height (40.20 cm) comparatively it is superior to the other treatments. The influencing factors are always for the growth of the plant height and it is of the nutrients which are from the organic manures and biofertilizers work as the available nutrients for the best growth of the plant height (Darshanth and Singh, 2014).

Table 3: The effect of paddy and coffee husk as the organic manure on the vegetative parameters of moth bean on 20, 40 and 60 DAS.

Treatments	Fresh weight (g)			Dry weight (g)		
	20 DAS	40 DAS	60 DAS	20 DAS	40 DAS	60 DAS
C	2.97	6.02	10.79	0.45	2.14	3.09
T1	3.54	6.85	11.34	0.54	2.32	3.74
T2	3.74	7.61	12.53	0.69	2.65	4.1
T3	4.11	7.99	14.97	0.99	3.32	4.19
T4	3.71	6.76	12.25	0.53	2.5	4
T5	3.93	7.01	13.41	0.73	2.42	4.03
T6	4.83	8.98	15.47	1.11	3.56	4.37
SEd		0.39463			0.36884	
CD (p<0.05)		0.79659**			0.74453****	

Significant at (p<0.05); DAS- Days after sowing.

Table 4: Influence of paddy and coffee husk as the organic manure on the yield parameters of the moth bean at 90 DAS.

Treatments	Number of pods /plant	Length of the pod (cm)	Number of seeds /pod	weight of the seeds/pod (g)	Pod fresh weight (g)	Pod dry weight (g)
C	15	3.4	4.0	2.01	0.986	0.521
T1	17	4.3	5.0	2.16	1.312	0.663
T2	18	4.1	4.0	2.42	1.283	0.843
T3	23	5.0	5.0	2.68	1.541	0.946
T4	16	3.8	5.0	2.33	1.041	0.713
T5	19	4.2	4.0	2.12	1.033	0.638
T6	27	5.7	6.0	2.89	1.653	0.986
SEd	0.1764	0.6355	0.2588	0.1633	0.1383	0.0319
CD (p<0.05)	0.3843	1.3631	0.5552	0.3503	0.2966	0.0685

** Significant at (p<0.05); DAS- Days after sowing.

Highest number of leaves (13.66) were found in leafy vegetables with the treatment of dead sheep compost in comparison with control (8.66) (Al-Sabbagh *et al.,* 2020). Similar results were observed by Kavya *et al*. (2021) that on applying RDF + Fe 0.5% + Zn 0.5% + Mn 0.5% recorded maximum height of the plant (42.42) at 60 DAS in *Vigna radiata* L.

Influence of paddy and coffee husk as the organic manure on the yield parameters of the moth bean [*Vigna aconitifolia* (Jacq) Marechal] at 90 DAS

The yield concept always based on the quantitative idea of the fertilizer is based on yield and nutritional requirement of the crop and the nutrient of the soil available with that of the applied fertilizer (Regar and Singh 2014; Sakarvadia *et al*., 2021).

The remarkable number of pods/plant, length of pod, number of seeds/pod, weight of the seeds/pod, pod fresh weight and pod dry weight found in the treatment 6 when it is compared to the control and all the other treatments, the Treatment 6 is followed by 3rd Treatment in its increase. The maximum number of pods/plant (27) number of seeds/pod (6) length of the pod (5.7 cm), weight of the seeds/pod (2.89 g), pod fresh weight (1.653 g) and pod dry weight (0.986 g) was found high among all the treatments and the minimum results were found in control as it is shown in Table 4 similar findings were found with the work of Ruheentaj and Sarawad, (2020) with the application of vermicompost on the growth of *Vigna aconitifolia* (Jacq) Marechal recorded highest yield (625.0 kg/ha) and significant results also found with the application of vermicompost and FYM in the increase of pod numbers (61.47/plant), pod length (8.67 cm) seed weight (1.96 g) it also coincides with that of findings of Sadashivanagowda *et al*. (2017) with incorporation of vermicompost in black gram yield is noticed to be highest. According to Sipai *et al*. (2018) with the incorporation of prophenophenol 50% EC at 0.05% and *Helicoverpa* in the module 4 showed great results in the growth of the moth bean yield seeds (1316 kg/ha) when compared with all the other modules.

Similar results were observed by Silpa and Vijayalakshmi, (2021) with the inclusion of Jackfruit peel vermicompost resulted in the highest yield of *Vigna unguiculata* (L) Walp in the treatment 8 such as number of pods (21), length of the pod (16.50 cm), weight of the seeds (1.68 g), pod fresh weight (5.711 g) and dry weight (2.398 g). The results of this particular study also is similar to that of Hasan *et al.* (2021) with the application of N and P fertilizer on Groundnut plants and found that the plant height (20.65) increased along with the number of pods 74.28% in treatment 15. Changkija and Gohain, (2018) obtained the significant results in increasing the grain weight (12.07 g) of soy bean with the application of poultry manure in treatment 6. Similar to these results Zebire and Gelgelo, (2019) reported that there was increase in the yield (74.2 g) of haricot bean with application of P fertilizer.

CONCLUSION

The present study clearly reveals the significant effect of paddy and coffee husk compost as organic manure on Moth bean and the significant values proved that it is effective bio compost specially the Treatment 6 which showed the maximum increase in the vegetative growth as well as yield parameters of the test plant. In conclusion we suggest that the biocomposting of agro industrial waste is the effective tool to protect the environment by lessening the harmful effects of the waste, as well as to increase the crop production and it can be suggested to the farmers to use the bio compost as the organic manure for better income as well as better results in the crop.

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Conflict of interest

I declare that authors have no conflict of interest regarding this article.

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