NEW STRATEGY FOR ENHANCING THE TRADITIONAL JUTE SEED PRODUCTION, SOIL FERTILITY AND FIBRE QUALITY BY UTILIZATION OF SAWDUST

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Accepted for publication on 17 August 2009

ABSTRACT

Gani, M.N., Alam, A. K. M. M., Asaduzzaman, M., Mollah, M. A. F, and Rahman, M. 2009. *New strategy for enhancing the traditional jute seed production, soil fertility and fibre quality by utilization of sawdust*. J. innov.dev.strategy 3(5): 1-4.

The study was carried out to estimate the effect of saw dust on traditional jute seed production and soil fertility during the year 2006-2008 at Manikganj farm of Bangladesh jute research Institute. The seed yield and yield contributing characteristics (plant height, base diameter, weight of 1000 seed, number of pod, number of seed and seed yield) were increased with saw dust significantly over control. Saw dust @4 tonne/hectare contributed the highest percentage of plant height, base diameter, number of pod and seed as well as seed yield over the control nutrient content of soil (OM, N, and P&K) found highest with the incorporation of saw dust @ 5 tonne/hectare. The growth and seed yield were reducing trends with incremental dose of saw dust @ 5 tonne/hectare Seed produced with saw dust showed more capability to get quality fiber than control and chemical fertilizer treatment (RDF). Highest lusture (22.80%), bundle strength (11.51Ib/mg) and finniest fiber (34.70u) found with seed produced applied saw dust @ 4 tonne/hectare. It reveals the study; saw dust @ 4 to 5 tonne/hectare may be a suitable for producing the traditional jute seed, enhancing the soil fertility and fiber quality. Study also creates evidence that saw dust will be an alternative new organic material source for crop production.

Keyword: Saw dust, Jute seed, Fibre Quality, Soil fertility

INTRODUCTION

Bangladesh is facing shortage of jute seed. Only 15.65% jute seed of total need of the country are being supplied by Bangladesh Agricultural Development Corporation (Annoss 1999). Scarcity of jute seed and high cost of chemical fertilizer also are of the factor which causes the disinterested of farmers in producing jute (Annoss 2003). It is high time to increase the seed production of jute. Efforts may be extended to increase yield traditional jute seed through minimize its production cost with chemical fertilizer and to raise the soil fertility of depleted soil of Bangladesh (Karim and Razi 1995). So that the farmers may become benefited and take interest to grow traditional jute seed. The traditional jute seed cultivation is most common practice in Bangladesh which grown at jute season (March to July) for getting both the fibre and seed. Soil of Bangladesh contains low organic matter due to increase of cropping intensity with HYV (Karim *et al.* 1995). To increase soil productivity, it is essential to apply organic materials for obtaining sustainable yield (Rabindra *et al.* 1985). But there are little availability of conventional sources of organic materials such as cow dung, weed, green manure and compost due to some unavoidable circumstances (Gani *et al.* 2001). So non conventional sources of organic materials (city waste compost, sewage sludge, sow dust etc) may be use to increase the soil fertility and yield and there by reduce the production cost. In Bangladesh there is no work with sow dust to soil and traditional jute seed production. Sow dust contain plenty of nutrients such as N (0.32%), P (0.15%) and (0.92%). Therefore an experiment was under taken to observe the effect of saw dust on the growth and yield of traditional jute seed, effect of saw dust on soil fertility, and effect of saw dust on fibre quality.

MATERIALS AND METHODS

The experiment was conducted at Manikganj (AEZ 8) under sonatala soil series in three consecutives year (2005-07). The treatments used in the experiment were 1. Control 2. Sow dust @ 1 tonne/hectare, 3. Sow dust @ 2t/ ha, 4. Sow dust @tonne/hectare, 5. Sow dust @4tonne/hectare, 6. Sow dust @ 5tonne/hectare, 7. Recommended dose of chemical fertilizer (RDFo90-10-40 NPK kg/ha). It was laid out in randomized block design with three replications. Unit plot size was 2.1 × 2. 1m. The space between the plots, blocks and around the field was one meter. HYV Falgooni Tossa was sown in the experiment. After final land preparation sow dust was incorporated to soil according to treatment desired. In the case of RDF treatment half of N full dose of P and K were applied from urea, triple super phosphate and muriate of potash respectively. At the stage of 100 days of sowing ¼ chemical fertilizer of RDF to the sow dust containing treatments and remaining half amount of N in RDF treatment were applied. Seeds were sown in line with spacing of 30 cm apart. Intercultural practices such as weeding, thinning, insect, pest and disease management were done properly. The plants of the experiment were harvested when 80% pods of the plants were brown in color. Different data of plant height, base diameter, No. of pod per plant and seed per pod were recorded for each plot. The weight to 1000 seed and yield of seed were also recorded after sun dried. Soil samples were collected before sowing to observe the initial nutrient status of soil. And second time soil samples were also collected after harvest of seed plants from different treated plots to asses the influence of saw dust on soil nutrients due its addition. Organic matter (OM) of soil sample was measured according to the method (Wet oxidation) of Walkey and Black (1934). Nitrogen (N) by microkjeldahl method according to (Jacson 1973). Phosphorus (P), Potassium (K) and pH of soil were determined by ASI method as described by Hunter (1984). Every year treatment wise seeds were sown for fibre

production on jute season and fibre was collected for quality test irrespective to industrial aspect viz: fineness, lusture and bundle strength. Lusture estimation of fibre, Leokometer was used (Anonymous 1981). Bundle strength was determined with pressly Bundle Strength Tester using zero gauge length. Fineness was estimated By Air flow method as described by Grover and Hambly (1960).

RESULTS AND DISCUSSIONS

The results of the different date (Table 1, 2 and 3) showed that there were significant effect of sow dust on the growth and yield of traditional jute seed production. Higher level of sow dust responses greater than lower level application on the growth and yield. Highest plant height (2.78m), number of pod/plant (16.90) number of seed/pod(180), weight of 1000 seed (2.4gm) and seed yield (0.56 tonne/hectare) obtained with sow dust @ 4 tonne/hectare over control. The base diameter found highest (13.40mm) with sow dust @ 4/ha. Data also showed the beigest plant height, base diameter and seed yield which found with sow dust exceeded over the result obtained with RDF(Table 1 and 3) Among he sow dust treatment, highest percent increment of seed yield (133.32) over the control found with sow dust @ 4/ha. Ahmad et al (1995) found similar type of results with sow dust in later jute seed production. Annoss (1994) reported in conducting an experiment with sow dust, water hyacinth, mustard straw and lentil straw on late jute seed and found highest seed (0.66 tonne/hectare) with sow dust. These findings are correlated with the result of present study. The study reflects a progressive increase of growth and yields with sow dust 4 tonne/hectare and then were reducing trends. It was observed from the Table 3 and 4 that nutrient status increased with the incorporation of sow dust. Highest OM (1.58%), N (0.32%), P (17 ppm) and K(0.18meq/100) found with sow dust @ 5 tonne/hectare over the control and RDF. Highest nutrient percent increment over initial soil nutrient also found with sow dust @ 5 tonne/hectare. Alim *et al.* (2001) observed that the sow dust increased the growth, yield of late jute seed and organic matter content of soil than the rice straw, compost and lentil straw incorporation to soil. Ahmad and Ahmed (1992) stated that other woodyh organic material (i.e. old jute seed powder) incorporate to soil increased NPK The findings of the results (Table 3 and 4) are in consonance of Prashad *et al.* (1991). They reported that the application of the dust of woody trees such as Teak, Subabul and Sal increased the available N, P, K and exchange Ca of soil.

Significant treatment difference was observed in different parameters (Table 6) of fibre quality like lusture, fineness and bundle strength. All the treated plots with saw dust increased the fibre quality over the control and RDF. Higher value of lusture, bundle strength and lower value fineness which are considered a good quality fibre obtained with all the treated plots over control (Table 6). The highest value of lusture, (22.80%) and bundle strength (11.51 lbs/mg) were found with T_5 (Sawdust 4 tonne/hectare). Lowest lusture value (16.90%) and bundle strength (8.991bs/mg) was found with T_1 (Control).

The finest fiber (34.70u) was obtained with the same treatment T5 (Saw dust 4 tonne/hectare) and comparatively coarse fibre (38.20u) with T7 (RDF). The result of the study (Table 6) showed) that the bundle strength (8.99 to 11.511bs/mg) and fineness (range34.70 to 38.20u) with different treatments were found within standard range. These results correlate with the finding of Samad and Islam (1991) and Mian (1996). Gani *et al.* (2002) reported such similar achievements with water hyacinth and chemical fertilizer.

Table 1. Effect of saw dust on plant height and base diameter of Jute seed plant

Treatment	Plant height (m)	% increment over control	Base diameter (mm)	% increment over control
T_1= Control	1.82	-	10.50	-
T_2=Saw dust@1 tonne/hectare	1.99	9.34	10.90	3.81
T_3=Saw dust @2 tonne/hectare	2.20	20.88	10.99	4.67
T_4=Saw dust @3 tonne/hectare	2.45	34.62	12.50	19.05
T_5=Saw dust @4 tonne/hectare	1.78	52.74	13.00	23.81
T_6 =Saw dust @5 tonne/hectare	2.60	42.86	13.40	27.62
T_7 =RDF	3.10	71.00	13.10	24.76
LSD at 0.05	0.56	-	1.46	-
LSD at 0.01	0.77	-	2.03	-

Table 2. Effect of saw dust on the number of pod/plant and number of seed/pod

Treatment	Number of pod/ Plant	% increment over control	Number of seed/pod	% increment over control
T_1= Control	7.10	-	101	-
T_2=Saw dust@1 tonne/hectare	7.15	0.70	154	34.42
T_3=Saw dust @2 tonne/hectare	10.50	47.88	160	58.41
T_4=Saw dust @3 tonne/hectare	13.80	94.37	155	53.47
T_5=Saw dust @4 tonne/hectare	16.90	138.03	180	78.22
T_6 =Saw dust @5 tonne/hectare	16.20	128.17	170	68.32
T_7 =RDF	15.00	111.27	178	76.24
LSD at 0.05	0.82	-	29.74	-
LSD at 0.01	1.14	-	41.28	-

Table 3. Effect of saw dust on the weight of 1000 seed and yield of seed

Treatment	Weight of 1000 seed (gm)	%increment over control	Seed yield (tonne/hectare)	%increment over control
T_1= Control	1.60	-	0.24	-
T_2=Saw dust @1 tonne/hectare	1.69	5.63	0.39	62.50
T_3=Saw dust @ 2 tonne/hectare	1.80	12.50	0.44	83.33
T_4=Saw dust @ 3 tonne/hectare	1.70	10.00	0.49	104.17
T_5=Saw dust @ 4 tonne/hectare	2.40	50.00	0.56	133.32
T_6 =Saw dust @ 5 tonne/hectare	2.00	25.00	0.53	129.16
T_7 =RDF	2.20	37.50	0.53	120.83
LSD at 0.05	0.29	-	0.12	-
LSD at 0.01	0.40	-	0.17	-

Table 4. Nutrient status of before sowing and after harvest of seed plant

	P^H	OC (%)	N (%)	P(ppm)	K(meq/100)
Soil nutrient status before sowing	6.63	1.24	0.18	12	0.13
Soil nutrient status after harvest					
T_1= Control	6.65	1.40	0.21	13	0.14
T_2=Saw dust @1 tonne/hectare	6.64	1.48	0.293	13	0.15
T_3=Saw dust @ 2 tonne/hectare	6.64	1.50	0.299	15	0.15
T_4=Saw dust @ 3 tonne/hectare	6.62	1.49	0.298	16	0.17
T_5=Saw dust @ 4 tonne/hectare	6.60	1.55	0.316	14	0.16
T_6 =Saw dust @ 5 tonne/hectare	6.55	1.58	0.324	17	0.18
T_7 =RDF	6.64	1.50	0.290	15	0.15

Table 5. Percent increment of nutrient status of soil due to incorporation of saw dust

Treatments	Percent increment over initial nutrient of soil				Percent increment over control			
	OM	N	P	K	OM	N	P	K
T_1= Control	-	-	-	-	-	-	-	-
T_2=Saw dust @1 tonne/hectare	12.90	16.67	8.33	15.38	5.71	39.52	-	7.14
T_3=Saw dust @ 2 tonne/hectare	19.35	46.11	8.33	15.38	7.14	42.38	15.38	7.14
T_4=Saw dust @ 3 tonne/hectare	20.97	65.56	25.00	30.76	6.42	41.90	23.07	21.42
T_5=Saw dust @ 4 tonne/hectare	20.16	75.55	33.32	23.07	10.70	50.48	7.69	14.28
T_6 =Saw dust @ 5 tonne/hectare	25.00	80.00	41.67	38.46	12.87	54.28	30.76	35.71
T_7 =RDF	20.96	61.11	25.00	15.38	7.14	38.09	15.38	7.14

Table 6. Effect of saw dust on the fibre quality

Treatment	Lusture (%)	Bundle strength (1bs/mg)	Fineness (μ)
1. Control	16.90	8.99	38.00
2. Saw dust@ 1/ha	18.50	9.25	35.40
3. Saw dust @2 tonne/hectare	22.40	10.15	36.70
4. Saw dust @3 tonne/hectare	18.90	11.12	35.30
5. Saw dust @4 tonne/hectare	22.80	11.51	34.70
6. Saw dust @5 tonne/hectare	22.75	9.49	37.10
7. RDF	21.70	10.35	38.20

CONCLUSION

In conclusion it reveals the study; saw dust @ 4 to 5 tonne/hectare may be a suitable for producing the traditional jute seed and enhancing the soil fertility. Study also creates evidence that saw dust will be an alternative new organic material source for crop production.

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