OnLine Journal of Biological Sciences 2 (1): 18-20, 2002

Effect of Fresh Jute Leaves on Soil and Late Jute Seed Production

Md. A. Alim, M. M. Alam, Ahsanul Haque, Nargis Akter, Zebun Naher and [1]A. S. M. Iqbal Hossain
Bangladesh Jute Research Institute, Manikmia Avenue, Dhaka-1207, Bangladesh
[1]Patuakhali Science and Technology University, Bangladesh

Abstract: An experiment was conducted to investigate the influence of fresh jute leaves as a source of plant nutrients on late jute seed production. Fresh jute leaves were collected just after harvest of jute crop and was incorporated to the soil at the rate of 0, 1, 2, 3, 4, 5 and 10 percent along with a recommended dose of chemical fertilizer (Urea-TSP-MP-Gypsum-Zincsulphate – Borax at the rate of 200-100-40-100-22-10 kg ha^{-1} respectively). With the increasing rate of fresh jute leaves pH of the soil successively decreased from 6.47 to 6.31 and organic matter content of the soil increased from 2.45 to 48.36 % and nutrient contents in soil was also increased and of N, P, K and S were increased upto 47.36,53.00, 62.50 and 55.55 percent respectively. A highly significant increase in number of branch, number of pod and seed yield was obtained with 4,5 and 10 percent of fresh jute leaves and a spectacular increase was also found with 1,2 and 3 percent of fresh jute leaves. The seed yield was significantly correlated with number of branches, number of seeds and number of pods per plant.

Key words: Fresh jute leaves, soil and late jute seed

Introduction

It has been observed that most of the developed countries and some of the developing countries of the world have already recommended that agricultural wastes can be recycled to farm lands to restore and maintain soil productivity at a high level. Now a days considerable progress has been made to conserve the locally available resources, which may add to the national wealth. The cost of chemical fertilizers is ever increasing. Moreover the continuous application of chemical fertilizers may cause adverse effect on soil structure ,soil binding character, water holding capacity and other beneficial soil conditions (Ahmad and Ahmad, 1990).If the local organic and manurial sources are properly recycled and managed it can supplement to a large extent, the plant nutrient needs (Gaur, 1985). To sustain soil productivity, it is essential to add a lot of organic matter along with chemical fertilizers to the soil (Robindra *et al*., 1985; Bhatia and Shukla, 1982).

It has been observed that any crop grown after jute cultivation thrives well. During harvesting time jute leaves remain unutilized. As a result a huge quantity of national resources are lost every year (Mohiuddin, 1987). It is also reported that application of different organic sources have a significant yield advantage particularly when they are applied freshly (Anonymous, 1987). The left-over biomass and shedding of jute leaves during growth period increased the nutrient status of soil (Ahad, 1987).

In this situation the growers can easily keep some jute leaves just after harvest of jute for using it in late jute seed production. There is a scarcity of jute seed in Bangladesh. Only 15.84% need of jute seeds are met by BADC in Bangladesh (Anonymous, 1999). Therefore ,the present study was undertaken to find out the effect of fresh jute leaves on late jute seed production and on soil nutrition as well as its possibility for using as a source of plant nutrients.

Materials and Methods

A four year investigation was carried out at Bangladesh Jute Research Institute's green house during 1997-2000.The Tejgaon sandy loams were collected and filled in size of 6"X8"X9" earthen pot having 10 kg soil.

The collected fresh jute leaves were throughly incorporated to the soil @ 0,1,2,3,4,5 and 10 percent of the soil and a set of recommended dose of fertilizers (200-100-40-100-22-10 as urea-T.S.P- MP-gypsum-zinc sulphate-Borax kg ha^{-1}) were applied.

Half of the urea and full dose of TSP, MP, zinc sulphate and Borax was applied at the time of sowing. The rest half of urea was splitted twice and applied at 25 and 45 days after of sowing respectively. Twenty five healthy seeds of *Corchorus olitorius* variety 0-9897 were sown in each pot in the first week of September in each year. After germination and cultural practices only three plants per pot were allowed to grow. All the intercultural operations were done in time. When 80% of pods became brownish in colour, the crop was harvested, The pods and seeds were dried in the air and cooled in desiccators. The data of different parameters of jute seed yield e.g., plant height, number of branch per plant, pod length, number of seed per pod, 1000 seed wt and seed yield were recorded. The seed yield per plant was determined from the average of 4 years and were analyzed. The jute leaves and initial and final (after 4 years) soil samples were also collected and processed and were analyzed for P, K and S as per methods of Hunter (1984). Nitrogen was determined by Kjeldahl method as described by Jackson (1973) and soil pH was determined in 1:2.5 (Soil : Water) suspen by pH meter and organic carbon was determined by Wet oxidation method by Walkley and Black (1934). Statistical analysis were done after Gomez and Gomez (1983). Nutrient status of jute leaves used in this experiment were, N=2.9085, P=0.42695,=3.167% and S=.01489%.

Table 1: Details of the treatment

Treatments	Fresh jute leaves (%)	Treatments	Fresh jute leaves (%)
T1	0	T5	10
T2	5	T6	2
T3	1	T7	RDF
T4	4	T8	3

Results

It is observed that OM, N, P, K and S of soil more or less increased with all the treatments over the control (Table 2). The range of increase of nutrient percentage over the control were OM 2.45-48.36, N 10.52-47.36, P 14-53, K 5.00-62.50 and S 2.22-55.55 with the treatments (Table 2). The pH of the soil decreased within the range 6.47 to 6.31 with increasing rate of added fresh jute leaves in comparison to initial soil pH (6.47) (Table 2). The seed yield increase was 8.53 to 102.29 % over control.

In T_5 (10 % fresh jute leaves) produced the highest (102,29%) seed yield over control and it was also higher than T_7 (92.88%) i.e., recommended dose of fertilizer. The effect was statistically highly significant in seed yield in T_2, T_4 and T_5. In respect of seed yield no significant yield difference were found among the T_2, T_4 and T_5 treatments but they differed largely from the rest of the treatments (Table 3). In the correlation co-efficient studies the seed yield was highly correlated with the plant height, number of branches per plant and the number of pods per plant (Table 4).

Table 2: Characteristics of initial and final soils

Treatment	pH	Organic matter(%)	Total N%	Available P(ppm)	Exchangeable K (meq %)	Available S(ppm)
Initial	6.47	1.27	0.21	12.03	4.5	11.00
Final,T1	6.49	1.22	0.19	10.00	4.0	9.00
T2	6.40	1.43(17.21)	0.23(21.05)	13.00(30.00)	5.6(40.00)	12.50(38.88)
T3	6.51	1.25(2.45)	0.192(1.57)	11.40(14.00)	4.2(5.00)	9.20(2.22)
T4	6.42	1.31(7.37)	0.22(15.78)	12.30(23.00)	5.2(30.00)	12.00(33.33)
T5	6.31	1.81(48.36)	0.28(47.36)	15.30(53.00)	6.5(62.50)	14.00(55.55)
T6	6.47	1.26(3.27)	0.21(10.52)	12.10(21.00)	4.5(12.50)	11.00(22.22)
T7	6.98	1.25(2.45)	0.21(10.52)	12.20(22.00)	5.5(37.50)	11.00(22.22)
T8	6.45	1.27(4.09)	0.21(10.52)	12.10(21.00)	5.0(25.00)	11.20(24.44)

Parenthesis indicates the percent of increase over the control.

Table 3: Effect of fresh jute leaves on seed yield and yield contributing characters per plant

Tr.	Number of branches	Number of pod	Pod length (cm)	Pod diameter (mm)	Number of seeds	1000 seed wt.(g)	Seed wt. (g)
T1	1.89	7.67	5.46	4.51	150.00	1.946	2.180
T2	3.33**	13.00**	5.46	4.54	181.00	1.945	4.348(99.44)**
T3	2.00	8.00	5.17	4.52	153.66	1.945	2.366 (8.53)
T4	3.33**	12.67**	5.73	4.58	172.33	1.942	4.150(90.36)**
T5	3.66**	13.33**	5.81	4.69	167.33	1.945	4.417(102.29)**
T6	2.22	8.33	5.63	4.42	154.33	1.944	2.499 (14.63)
T7	3.44**	13.00**	5.60	4.37	167.00	1.950	4.205(92.88)**
T8	2.33	8.67**	5.52	4.43	157.00	1.949	2.601(19.31)*

*Significant at 5% level and **Significant at 1% level Parenthesis indicate the percent of increase over control

Table 4: Correlation co-efficient between plant characters of late jute seed crop

Plant Characters	Number of branches	Number of pod	Pod length	Pod breadth	Number of seed	1000 seed wt.	Seed Wt.
Branch	-	0.985**	0.788*	0.328	0.809*	0.132	0.978**
Number of pod	-	-	0.524	0.331	0.818*	0.067	0.996**
Pod length			-	0.616	0.585	0.399	0.788*
Pod breadth				-	0.148	0.560	0.296
Seed/pod					-	0.005	0.865**
1000 seed wt.						-	0.06

Discussion

Jute leaves contains a substantial amounts of nutrients (Table 1). With the increasing rate of fresh jute leaves the O M and nutrient status of soil were increased (Table 2).The increase could be due to the incorporation of additional mass of fresh jute leaves and direct addition of N,P,K and S through addition of fresh jute leaves. This might be due to the supply of additional plant nutrients from addition of jute leaves and may be due to rapid decomposition of jute leaves as rate of decomposition of plant tissues (Ahad, 1987). Prasad *et al.* (1991) observed the similar results with the incorporation of different tree leaves viz. teak eucalyptus and subabul. Nasimul Gani *et al.* (1999) reported 64% organic matter increase over control through crop residue of jute. Sidhu and Beri (1989) also showed the beneficial effect of crop residues on microbiological, physical and chemical properties of soils. In general higher dose of fresh jute leaves resulted in decreased pH over their respective lower dose and control (Table 2). This might be attributed to the formation of organic acids during the decomposition of jute leaves. The findings are in agreement with Maurya and Ghosh (1972) and Nasimul Gani *et al.* (1999).

All the seed yield parameters were more or less influenced with fresh jute leaves (Table 3). With the increased dose of fresh jute leave the jute yield was also increased successively. Maximum seed yield was obtained with T5 as compared with other treatments (Table 3).The decomposition of fresh jute leaves is accompanied by the release of appreciable quantities of CO_2 which when dissolved in water, forms carbonic acids, which is capable of decomposing certain primary minerals and release of nutrients (Bharadwaj and Omanwar, 1994). A significant effect of jute leaves applying with urea on the plant height, number of tiller, straw and grain yields of wheat was reported by Suja (1985).Addition of leaf residue significantly increased the mean biomass production of three tree species (Singh *et al.*, 1991). Khandker *et al.* (1992) reported application of organic matter in the same soil of two consecutive years improves the yield and yield contributing parameters of sugarcane in the following year. The yield increase due to the application of fresh jute leaves might be contributed by improvement of soil texture, high holding capacity of soil and enhanced availability of plant nutrients.

Positive correlation co-efficient between number of branches and number of pods and number of branches and seed yield were also reported by Talukder and Hossain (1989). Khan (1995) reported very high and positive correlation among the number of branches per plant with number of pods and seed yield.

In conclusion it may be suggested that the fresh jute leaves might be applied as a possible supplemental source of nutrients in the production of jute seed.

References

Ahad, M., 1987. Residual effect of some common grown crops. B. J. Jute Fib. Res., 12: 73-82.

Ahmad, S. A. and I. U. Ahmad, 1990. Effect of waste jute seed powder on the growth and yield of jute. B. J. Soil Sci., 21: 73-76.

Anonymous, 1999. Proceedings of National Semnar on Seed Industry Development. pp: 50. CDP, Seed Industry Promotion Unit, Dhaka.

Anonymous, 1998. Annual report. Bangladesh Jute Research Institute.

Anonymous, 1987. Annual report. Bangladesh Rice Res. Institute.

Bharadwaj, V. and P. K. Omanwar, 1994. J. Indian Soc. Soil Sci., 42: 387.

Bhatia, K. S. and K. K. Shukla, 1982. Effect of continuous application of fertilizers and manures on some physical properties of (eroded) alluvial soil. J. Indian Soc. Soil Sci., 30: 33-36.

Gaur, A. C., 1985. Inter-Congress Conference of Commission IV. Dhaka, Bangladesh, pp: 62-63.

Gomez, K. A. and A. A. Gomez, 1983. Statistical Procedure for Agricultural Res. 2nd Ed. Intl. Rice Res., Inst. Manila, Philippines, pp: 1-207.

Hunter, A. H., 1984. Agro Service Intrernational. Consultancy report. Soil fertility Analytical Services In Bangladesh. Bangladesh Agricultural Research Project Phase-II.

Jackson, M. L., 1973. Soil chemical Analysis, Prentice Hall of India Private Limited, New Delhi, pp: 183.

Khan, M. A., 1995. Effect of sowing date and genotypes on Olitorius Jute seed production. M.Sc. Thesis. Bangladesh Agricultural University, Mymensingh.

Khandaker, M., M. H. Rahman, M. A. Majid and A. H. M. D. Hossain, 1992. Influence of different organic manures on sugarcane productivity. Inter- Congress Conference of Commission IV. Dhaka, Bangladesh, pp: 58.

Mohiuddin, G., 1987. Protein in jute leaves. Sonali Ansh(A bengali publication). Bangladesh Jute research Institute, pp: 72-78.

Maurya, P. R. and A. B. Ghosh, 1972. Effect of long term manuring and rotational cropping on fertility status of alluvial calcareous soil. J. Indian Soc. Soil Sci., 20: 31-35.

Nasimul Gani, Md. Maqsudul Alam, A. K. M. Suraiya Khandker and S. A. Ahmed, 1999. Biomass Estimation of Jute and its effect on soil. Bangladesh J. Sci. Res., 17: 157-162.

Prasad Arun, N. G. Totey, P. K. Khatri and A. K. Bhowmik, 1991. Effect of added tree leaves on the composition of humus and availability of nutrients in soil. J. Indian Soc. Soil Sci., 39: 429-434.

Robindra, B., G. V. Narayanswany, N. A. Janardham, Gowdha and Shivanayappa, 1985. Long range effect of manures and fertilizers on soil physical properties and yield of sugarcane. J. Indian Soc. Soil Sci., 33: 704-706.

Sidhu, B. S. and V. Beri, 1989. Biol. Wastes, 27,15.

Singh, S. B., Promad Kumar and K. G. Prasad, 1991. J. Indian Soc. Soil Sci., 39: 229-232.

Suja, A., 1985. Effect of indigenous organic sources complement to urea on the growth and yield of wheat. 10 th Annual Bangladesh Science Conference, Abstract of the Scientific Papers, pp: 56.

Talukder, F. A. and M. A. Hossain, 1989. Response of yield components of *C. capsularis* L. to seed yield. B. J. Jute and Fibre Res., 14: 31-35.

Walkley, A. and C. A. Black, 1934. An examination of the Degtareff method for determining soil organic matter and a proposed modification of the chromic acid titration method. Soil Sci., 37: 29-38.