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Assessment of Soil Fertility, Fibre Production, Nutritional and Medicinal Values of Jute Leaves as Affected by Indigenous Organic Matters Management

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Abstract

An experiment was conducted Dhaka Central Research Station of Bangladesh Jute Research Institute, Manik mia Avenue, Dhaka-1207 at 23O45' north latitude and 90022' east longitude with an intension to evaluate soil fertility, fibre production and assess the nutritional and medicinal value of jute leaves. The treatments were: T1 – Control (without fertilizer), T2 - Recommended dose of inorganic fertilizer (RDF), T3 - Jute seed powder @ 5t/ha, T4 - Compost @ 5t/ha, T5 - Cowdung @ 5t/ha, T6 - Poultry litter @ 5t/ha and T7 - Farm yard manure (FYM) @ 5t/ha. O-9897 of *corchorus olitorius* L., was used as test crop. Results revealed that the organic sources jute seed powder, cow dung, compost, poultry manure and farmyard showed higher nutrient status than initial soil, control and RDF treatment value. Maximum OM (1.323%) found with the addition of poultry litter (T6). Plant height, base diameter, fibre and stick yield found higher with all treatments over the control (T1). Among the organic sources, cowdung contributed the highest fibre (2.26t/ha) and stick (4.91t/ha) yields. On the basis of yield performance the treatments could be arranged as cowdung > jute seed powder > Farmyard manure > poultry litter. The insignificant yield was found in RDF (T2) compared to different treatments of organic matters. Moisture (ranges 78-86%), Protein (ranges 4.26-6.51%), Carbohydrate (ranges 4.10-6.41%), Ascorbic acid (ranges 200-340ppm), Thiamin (ranges 0.07-0.082ppm), Riboflavin (ranges 0.070-0.082) and Niacin (ranges 0.40-0.66 ppm) were recorded the appreciable nutritional value of jute leaves with the treatments. All the organic matter involved treatments gave higher nutritional and mineral content of jute leaves than control and RDF. The range of major mineral components recorded in leaves as Ca (1.20 to 1.31%), K (2.08 to 3.10%), Mg (0.15 to 0.153%), Na (0.32 to 0.51%) and Fe (0.02 to 0.051%).

Keyword: Indigenous organic matter; Jute; Soil fertility and food quality of jute leaves

Introduction

Bangladesh is the cumulative effect of many soil related constrains. The important reasons are depletion of soil organic matter, nutrient mining, scant use of bio and organic fertilizer and poor management practices [1]. In Bangladesh most soils have than 17g/kg and some have 10gn/kg organic matters causes low crop productivity. It is urgent to increase the organic matter so effort needs to take by different sources of organic matter on in site green mounting leafy crop like (Jute) or other strategy to enrich quick soil fertility and to obtain higher yield and oregano leafy vegetable [2]. The demand of jute leaves (as vegetable) ore increasing day by day in the world. Jute is a native which eaten in tropical Africa and Asia, and has since spread to Australia, South America and some parts of Europe. Its leafy vegetable is popularly used in soup preparation and folk medicine for the treatment of fever, chromic cystitis, cold and tumors [3].

Jute leaf juice, fried leaf, and some time whole green leaf, are used, among other reasons, as laxatives, in creams for skin care, and as a treatment for a wide range of diseases, respectively. The heterogeneous nature of jute leaf products may contribute to the diverse biological and therapeutic activities that have been observed. Variations in the composition of jute leaf can result in products with different chemical and physical properties, making the comparison of products difficult. The green, leafy vegetable is rich in beta-carotene for good eyesight, iron for healthy red blood cells, calcium for strong bones and teeth, and vitamin C for smooth, clear skin, strong immune cells, and fast wound-healing. Vitamins A, C and E present in jute leaf/Saluyot "spongeup" free radicals, scooping them up before they can commit cellular sabotage. Jute leaf as vegetable contains an abundance of antioxidants that have been associated with protection from chronic diseases such

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Table 1: Nutrient content in different sources of indigenous organic matter.

Organic sources	Moisture %	pH	Total N%	P %	K %	Ca %	Mg %	S %	Zn %
Poultry litter	17	6.8	2.2	1.1	1.08	1.2	0.5	1.1	0.02
Jute seed powder	15	6.7	3.68	0.78	0.05	0.022	0.007	1.34	0.015
Farm yard manure	20	6.5	1.17	0.9	1.7	0.99	0.47	0.09	0.016
Cow dung	18	6.7	1.16	0.98	1.62	0.8	0.39	1	0.013
Compost	16	6.56	0.96	0.69	1.2	0.76	0.4	1.1	0.012

Table 2: Initial and post harvest soil nutrient status of the experimental field.

Site CRS, Dhaka		OM %	N %	P Ppm	K meq/100	S ppm	pH
Initial soil		1.3	0.09	13	0.12	13	6.5
Post harvest soil							
T_1 - Control		1.3	0.091	13	0.11	13	6.55
T_2 - RDF		1.305	0.091	14	0.12	13	6.6
T_3 - Jute seed powder @ 5t/ha		1.31	0.093	14	0.13	14	6.55
T_4 - Compost @ 5t/ha		1.317	0.095	13	0.15	14	6.5
T_5 - Cowdung @ 5t/ha		1.32	0.091	15	0.14	15	6.65
T_6 - Poultry litter @ 5t/ha		1.323	0.094	14	0.14	14	6.7
T_7 - FYM @ 5t/ha		1.32	0.095	13	0.13	13	6.55
LSD	0.05	0.1	0	1.99	0.02	1.75	0.07
	0.01	0.14	0	2.76	0.03	2.43	0.09

as heart disease, cancer, diabetes, and hypertension as well as other medical conditions. Fresh jute leaf has higher demand. Ayurvedics use the leaves for ascites, pain, piles (laxative), and tumors. Elsewhere the leaves are used for cystitis, dysuria, and fever. The cold infusion is said to restore the appetite and strength. In this article, the biochemistry, uses and pharmacological activity of jute leaf fry, juice and curry compounds are reviewed [4].

The young jute leaves can be eaten raw or cooked and it contains high levels of protein and vitamin [5]. Jute leaves are usually recommended for pregnant women and nursing mother because it is believed to be rich in iron [6]. Jute leaves are cheapest vegetable and available sources of important proteins, vitamins, menials and essential nutrient [7]. Protein, lipid, calcium, iron, carotene, vitamins, folic acid and some enzymes have been reported from the leaves. A large number of phytoconstituents with their structures including flavonoids, saponins, tannins, steroids, glycosides, sugars and triterpenes and their applications have also been reported from the leaf, bark, root and seeds of the species. Many of these compounds have been found to possess significant biological responses like cardiac, antinociceptive and anti-inflammatory activities [8]. Great promise and a comparative efficacy between the gum extract obtained from *Corchorus olitorius* L. and the SCMC [9].

The world demand of jute leaves has been increased in the recent years. Export possibility has created for Bangladesh, so opportunity may avail to build up foreign stock. Current information on the nutritive and medicinal values of jute leave is scanty. In most cases this knowledge is not well documented and disseminated. Traditional in leafy vegetable have a proven nutritive value in terms of having more protein, minerals, carbohydrate and vitamins than some exotic vegetable [10,11]. Facts this study was designed as there are references that different organic manure enrich the soil fertility, crop quality and nutritional value of vegetables [12]. Considering the above facts, this study was under taken to evaluate soil fertility, fibre production and to assess the nutritional and medicinal value of jute leaves.

Materials and Methods

The experiment was conducted Dhaka central research station of Bangladesh Jute Research Institute, Manik mia Avenue, Dhaka-1207. Site was situated at $23^{O}45'$ north latitude and $90^{0}22'$ east longitude. The treatments were used as follows - T_1 - Control, T_2 - Recommended dose of inorganic fertilizer (N_{90}-P_{10}-K_{30}-S_{20} kg^{-ha}), T_3 - Jute seed powder @ 5t/ha, T_4 - Compost @ 5t/ha., T_5 - Cowdung @ 5t/ha., T_6 - Poultry litter @ 5t/ha., and T_7 - Farm yard manure (FYM) @ 5t/ha. The O-9897 of *corchorus olitorius* L., popular variety was sown in mid April as a test crop. Fertilizers were applied according to treatment design. Unit plot size was 3.0m × 2.10m. Space between plots, blocks and around the field was one meter. The experiment was laid out in randomized complete block design having three replications. All the cultural practices during jute cultivation such as weeding, thinning and spraying were done as and when necessary. The plants were harvested at the age of 120 days. All the necessary data regarding yield components were recorded such as plant height, base diameter, fibre and stick yield. Initial and post harvest soils were collected duly and analyzed. The fresh jute leaves samples of different treatments were collected for nutritional and mineral content analysis.

Fertilizers were applied to the soil on soil test basis considering the value of nutrient content of different sources of indigenous organic matter.

Methods of soil chemical analyses

Soil pH: The glass electrode pH meter was used to determine pH of the soil. The ratio of the soil and water in the suspension was maintained at 1:2.50 [13].

Total nitrogen: Total nitrogen of soil was determined by microkjeldahl method where soil was digested with 30% H_2O_2, conc. H_2SO_4 and catalyst mixture (K_2SO_4, $CuSO_4$, $5H_2O$: Selenium

Table 3: Growth and yield parameters with the addition of organic materials sources.

Treatments		Plant height (m)	Base diameter (mm)	Yield of fibre (tha^{-1})	Yield of stick (tha^{-1})
T_1 - Control		1.20	10.35	1.20	2.64
T_2 - RDF		3.12	14.87	2.31	5.61
T_3 - Jute seed powder @ 5/ha		3.26	14.36	2.21	4.63
T_4 - Compost @ 5t/ha		2.94	14.11	2.18	4.75
T_5 - Cowdung @ 5t/ha		3.22	14.85	2.26	4.91
T_6 - Poultry litter @ 5t/ha		3.19	15.38	2.16	4.65
T_7 - FYM @ 5t/ha		3.08	13.66	2.20	4.86
LSD	0.05	0.53	1.66	0.17	0.14
	0.01	0.73	2.31	0.23	0.19

Table 4: Nutritional value of jute leaves with different treatments.

Treatment		Moisture %	Protein %	Carbohydrate %	Ascorbic Acid (Vit. C) ppm	Thiamin ppm	Riboflavin ppm	Niacin ppm
T_1 - Control		78	4.26	4.1	200	0.03	0.07	0.4
T_2 - RDF		80.2	5.8	4.25	220	0.045	0.07	0.5
T_3 – Jute seed powder @ 5t/ha		80.25	5.78	4.2	340	0.048	0.072	0.61
T_4 - Compost @ 5t/ha		83	6.4	5.25	320	0.047	0.08	0.59
T_5 - Cowdung @ 5t/ha		86	6.41	5.4	310	0.048	0.079	0.66
T_6 – Poultry litter @ 5t/ha		84.2	6.28	6.41	250	0.045	0.082	0.65
T_7 - FYM @ 5t/ha		84.5	6.39	5.2	266	0.05	0.05	
LSD	0.05	2.2	0.1	0.34	50.22	0.01	0.38	0.05
	0.01	3.05	0.15	0.48	69.7	0.01	0.52	0.06

powder in the ratio100:10:1). Nitrogen in the digest was estimated by distillations with 40% NaOH followed by titration of the distillate trapped in H_3BO_3 with 0.01N H_2SO_4 [14].

Available phosphorus: Available Phosphorus was extracted from soil, the extraction was made with [15] dilute acid fluride method described by Kuo. Spectronic-21, Baush and Lomb spectrophotometer was used to measure the color intensity at the wave lengths of 880nm following the ascorbic acid blue color method.

Exchangeable potassium: Exchangeable potassium was determined by neutral 1N NH_4OAc (pH_7.0 (one normal ammonium acetate) extract of the soil by using flame photometer [16].

Exchangeable calcium and magnesium: Exchangeable calcium and magnesium were extracted with neutral1N NH_4OAc (One normal Ammonium acetate) as described by [17]. The calcium and magnesium were determined by atomic absorption spectrophotometer.

Available sulphur: Available sulphur was determined by extracting the soil sample with 0.15% $CaCl_2$ solution. The Sulphur content in the extract was determined turbdimetrically and the intensity of turbid was measured by spectrophotometer at 420 nm wavelength.

Available zinc: The content of zinc and lead of the soil sample was extracted by aqua-regia (concentrated HCL: Concentrated HNO_3: 3:1) digestion. The lead and zinc concentrations were analyzed by Flame Emission Atomic Absorption Spectrometer [16].

Mineral content of jute leaves samples

Jute leaves Sample processing for determination moisture, protein, carbohydrate, vitamins and mineral content: The fresh jute leaves samples of different treatments were collected (500g from each plot) randomly at the age of 60 days plants from its tips. The leaves were removed from the tip stem and fresh edible leaves used for moisture determination at 105°c in an air-oven, drying to constant weight. The leaves of the remaining fresh vegetables leaves were dried to constant weight at 90°c (for needful analysis). All dried subsamples were collected together and ground in to a composite powdered. These composite powders of different treatments were packaged in airtight plastic container and stored in a freezer for further analyses.

Digestion of jute leaves sample: Leaves samples were digested with sulphuric acid and digestion mixture (catalyst) and nitrogen was determined by alkali distillation of the Kjeldahl digest [18].

Digestion of plant samples with nitric perchloric acid mixture: An amount of 0.5gm of sub samples was taken into a dry clean 100ml of Kjeldahl flask, 10ml of di- acid mixture (HNO_3, HCl_4 in the ratio of 2:1) was added and kept for few minutes. Then the flask was heated at a temperature rising slowly to 200°C. Heating was instantly stopped as soon as the dense white fumes of $HClO_4$ occurred and after cooling, 6ml 6NHCl were added to it. The content of the flask was boiled until it became clear and colour less. The digest was used for determining Phophorus (P), Potassium (K) and Sulphur (S).

Phophorus: Phosphorus in plant samples is determined by the yellow color method with help of a spectrophotometer.

Potassium: Potassium was determined directly by flame photometer (Jenway PFP-7) as described by [18].

Sulphur: Sulphur content in the digest was determined by turbidimetric method as described by [19] using spectrophotometer.

Nutritional (chemical) analyses of jute leave samples

Moisture content, protein (Kjeldahl method) and carbohydrate

Table 5: Mineral contents in jute leaves with different organic treatments.

Treatment	N	P	K	S	Ca	Mg	Na	Fe
T_1 - Control	2.08	0.34	2.08	0.01	0.12	0.15	0.32	0.02
T_2 - RDF	2.5	0.053	2.57	0.073	0.126	0.152	0.43	0.041
T_3 - Jute seed powder @ 5/ha	2.56	0.56	2.51	0.07	0.128	0.15	0.51	0.032
T_4 - Compost @ 5t/ha	2.44	0.51	3	0.015	0.127	0.153	0.48	0.042
T_5 - Cowdung @ 5t/ha	2.5	0.48	2.95	0.071	0.13	0.152	0.5	0.051
T_6 - Poultry litter @ 5t/ha	2.53	0.41	3.02	0.065	0.131	0.152	0.51	0.035
T_7 - FYM @ 5t/ha	2.51	0.43	3.1	0.064	0.127	0.151	0.5	0.05
LSD 0.05	0.05	0.03	0.1	0	0	0	0.04	0
0.01	0.07	0.05	0.14	0	0	0.01	0.06	0

were determined using standard method [20].

Vitamins

Ascorbic acid (Vitamin C): 2.0g of the sample was weighed into an extraction tube and 100ml of EDTA/TCA (2:1) extracting solution were mixed and the mixture shaken for 30min. This was transferred into a centrifuge tube and centrifuged at 3000rpm for about 20min. It was transferred into a 100ml volumetric flask and made up to 100ml mark with extracting solution. 20ml of the extract was pipette into a volumetric flask and 1% starch indicator was added. These were added and titrated with 20% $CuSO_4$ solution to get a dark end point [21].

Niacin: 2.0g of the sample was treated with 50ml of 1N sulphuric acid and shaken for 30min. 3 drops of ammonia solution were added to the sample filtered. 10ml of the filtrate into a 50ml volumetric flask and 5ml Potassium cyanide was added. This was acidified with 5ml of 0.02N H_2S_4 and absorbance measured in the spectrophotometer at 470nm wavelengths [22].

Riboflavin: 2.0g of the sample was extracted with 100ml of 50% ethanol solution and shaken for 1h. This was filtered into 100ml flask; 10ml of the extract was pipette into 50ml volumetric flask. 10ml of 5% potassium permanganate and 10ml of 30% H_2O_2 were added and allowed to stand over a hot water bath for about 30min. 2ml of 40% sodium sulphate was added. This was made up to 501ml mafk and the absorbance measured at 510nm in a spectrophotometer [22].

Thiamin: 2.0g of the sample were homogenized with ethanolic sodium hydroxide (50ml). It was filtered into a 100ml flask. 10ml of the filtrate was pipette into 100ml flask and the color developed by addition of 10ml potassium dichromate and read at 360nm. A blank sample was prepared and the color also developed and read at the same wavelength [22].

Mineral content analysis of jute leaves samples

Digestion of leave sample: Jute leaves samples were digested with sulphuric acid and digestion mixture (catalyst) and nitrogen was determined by alkali distillation of the Kjeldahl digest [18].

Digestion of leaves samples with nitric perchloric acid mixture

An amount of 0.5gm of sub samples was taken into a dry clean 100ml of Kjeldahl flask, 10ml of di- acid mixture (HNO_3, HCl_4 in the ratio of 2:1) was added and kept for few minutes. Then the flask was heated at a temperature rising slowly to 200^{0}C. Heating was instantly stopped as soon as the dense white fumes of $HClO_4$ occurred and after cooling, 6ml 6NHCl were added to it. The content of the flask was boiled until it became clear and colour less. The digest was used for determining Phophorus (P), Potassium (K) and Sulphur (S).

Phophorus: Phosphorus in plant samples is determined by the yellow color method with help of a spectrophotometer.

Potassium: Potassium and sodium were determined directly by flame photometer (Jenway PFP-7) as described by [18].

Sulphur: Sulphur content in the digest was determined by turbidimetric method as described by [19] using spectrophotometer.

Ca, Mg, Zn, Na and Fe: Determination of mineral content Ca, Mg, Zn, Na and Fe were estimated by analyzed using the atomic absorption spectrophotometer [8].

ANOVA was used to analyze the results obtained from different treatments. At 95% confidence level, there is a statically difference in the growth, yield moisture content, Protein, Carbohydrate Ascorbic acid (Vit. C), Thiamin, Riboflavin and Niacin and mineral contents like N, P, K, S, Ca, Mg, Na and Fe of the investigated jute leaves vegetables.

Results and Discussion

Soil nutrient status

Initial and post harvest soil nutrient status were determined. It was observed that all the sources of organic material increased the soil OM, N, P, K and S significantly (Table 2) over initial soil nutrient status. Jute seed powder, cow dung, compost, poultry litter and farmyard manure showed higher nutrient status than initial soil, control and RDF treatment value. Maximum OM (1.323%) found with poultry litter (T_6). Similar findings reported [23] for increased soil fertility due to addition of rice straw, wheat straw, lentil straw, jute leaves, compost and saw dust during the cultivation of late jute seed crop. This is the agreement of [24]. They achieved increased soil nutrients over control through residues of jute crop. These findings are inconformity with observation of the research worker [25] who found, enhanced soil fertility with effect of other organic sources of poultry manure in crop production. There was set up an incubation experiment [26] with five doses (0%, 2%, 4%, 6% and 8%) of organic residues viz. maize stalks, cotton stalks or almond bark and obtained improved soil.

The different sources of organic materials contain adequate amount of nutrients (Table 1). Results showed that sources of on organic materials had significant effect on the growth and yield of jute (Table 3) viz. plant height, base diameter, fibre and stick yield. All these parameter found higher over the control. Among the organic sources, cowdung contributed highest fibre (2.26 t/ha) and stick yield

1(a) 1(b)

Figure 1: (a) Compost; (b) Jute leaves.

2(a) 2(b)

Figure 2: (a) BJRI Soil Science Laboratory; (b) Experimental jute field.

(4.91t/ha). On the basis of yield performance it can be arranged the of organic sources cowdung > jute seed powder > Farmyard manure > poultry litter. The yield, in the treatment RDF (T_2) found insignificant compare to different treatments of local organic matter. Earlier research workers reported that the application of organic matter improves the yield and yield contributing characters of sugarcane [27].

From an investigation of the effects of different sources of organic matter (i.e., compost, leguminous green manure, and peat) on the growth and yield of corn and rice plants. These sources of organic matter application not only produced sufficient nutrients also increased crop growth and yield [28]. The performance of rice straw (RS) was evaluated in farmers' field for supplementing K requirement of rice and compared with agro-ecological zone (AEZ)-based chemical fertilizer and farmers' practice in Tista Meander Floodplain soils of Bangladesh. Application of RS @ 4.5tha^{-1} enhanced the yield of rice crop [29] (Figure 1).

The nutritional value of jute leaves results, moisture content ranges from 78% to 86% (Table 4). Jute leaves with the different treatments have high percentage of moisture content, this was an indication that they posses large number of cell saps. Water was clearly the most important and the most abundant substance in the human body. Water comprises about three quarters of the human mass and is a major component in every cell. In addition water is needed to separate (by a process called hydrolysis) a phosphate group from adenosine tri phosphate (ATP) or guano sine triphosphate (GTP) to get energy [30]. It was also supported by [31] that water is the containing medium for electrocutes and all other ions throughout the human body.

Jute leaves contained (Ranges 4.26 to 6.41%) appreciable amount of protein which indicates that the vegetables can be used for building and repairing of body tissues, regulation of body processes and formation of enzymes and hormones. Proteins also aid in the formation of antibodies that enable the body to fight infection. Proteins serve as a major energy supplier [32]. The percentage (4.10 to 6.41%) of carbohydrate in the jute vegetable leaves studied are an indication that it can be used to regulate various metabolic processed in the body as key molecules in the central metabolic pathways of the body. Carbohydrate also serves as stored forms of energy as glycogen in liver and muscles. It also provides major source of energy and responsible for breaking-down of fatty acids and preventing ketosis [33].

All the jute leaves from treated plots under study contain ascorbic acid (Vitamin C) and the concentration varied from 200 to 340 ppm. Study revealed that jute leaves also a good source of ascorbic acid. Maximum achieved with jute seed powder and minimum with control. Ascorbic acid (Vit. C) an antioxidant which helps to protect the body against the cancer and other degenerative disease such as arthritis and diabetes mellitus. Yet this ascorbic acid (Vitamin C) also strengthening the immune system [9]. Natural ascorbic acid is vital for the body performance [34]. Lack of ascorbic acid impairs the normal formation of intercellular substances throughout the body, including collagen, bone matrix and tooth dentine. A striking pathological resulting from this defect is the weakening of the endothelial wall of the capillaries due to a reduction in the amount of intercellular substances [19]. Therefore, the clinical manifestations of scurvy hemorrhage from mucous membrane of the mouth and gastrointestinal tract, anemia, pains in the joints can be related to the association of ascorbic acid and normal connective tissue metabolism [34]. This function of ascorbic acid also accounts for the requirement for normal wound healing. As a result of the availability of ascorbic acid in all the vegetables, they can be used in herbal medicine for the treatment of common cold and other diseases like prostate cancer [34]. In conclusion the study has showed that the leafy vegetables contain appreciable level of nutrients which are readily available. Hence they could be consumed to supplement the scarce or non-available sources of nutrients. The results of vitamin analysis of jute

leaves with different treatments are showed (Table 4) in rich thiamin (range 0.03 to 0.05 ppm), riboflavin (range 0.07 to 0.082 ppm) and niacin (0.40 to 0.60 ppm) which essential for human body (Figure 2).

Mineral content also rich in jute leaves which need for human body such as Nitrogen (N), Phosphorus(P), potassium (K), Sulfur (S), calcium (Ca), magnesium (Mg), sodium (Na) and iron (Fe) [35]. The range of major mineral components recorded in leaves include Ca (1.20 to 1.31%), K (2.08 to 3.10%), Mg (0.15 to0.153%), Na (0.32 to 0.51%) and Fe (0.02 to 0.051%) (Table 5). Ca is major factors sustain strong bones and plays a part in muscle contraction and relaxation, blood clotting etc. K and Mg are act to decrease blood pressure. Potassium plays a role in controlling skeletal muscle contraction and never impulse transmission. Patient with soft bone problems are usually placed on high calcium vegetable meals. Jute leaves also contain iron (Fe) needed in hemoglobin formation and recommended for anemic convalescence [36]. Na and K are important intracellular and extracellular cat ions respectively, which are involved in the regulation of plasma volume, acid-base balance, and nerve and muscle contraction [35].

The results achieved in this study (Table 4 and 5) showed a close agreement with the findings of [37]. Beside this there were references of health benefits by using of jute leaves namely internal bleeding control, Protects Eye Health, Restless Leg Syndrome, Supports Skin Health and Cell Growth, Fights off Colds and flu, Reduces Cholesterol, Cancer, Maintains Healthy Teeth and Gums, Prevents Asthma, Protects Healthy Hair and Skin, remedy for dysentery, aches and pains, fevers, enteritis, pectoral, and constipation etc [38].

Current information on the nutritive and medicinal value of leafy vegetable is scanty. In most cases, this know-ledge is not well documented and disseminated. Traditional jute leafy vegetable have a proven nutritive value in terms of having more protein, minerals, carbohydrate and vitamins than some exotic vegetable [10,11]. Findings from the present study could be useful in jute cultivation, addressing some of the problems of nutritional deficiencies in rural Bangladesh communities by jute leaves consuming and hence may also be useful in strengthening current community- based health services. Of course, the study is created an informative technology to maintain human health through intake of very cheaper vegetable jute leaves.

Conclusion

The findings of this research indicate that it is possible to increase the soil fertility and productivity of jute with local sources of organic matter viz: Jute seed powder, compost, cowdung, poultry litter and farm yard manure @ 5 t/ha. This study showed that appreciable amount of vitamins, nutritional and mineral contents increased in jute leaves with the treatments of organic matter. By acquiring knowledge from this study, peoples will be interested to take jute leaves in their dishes to have a medicinal use apart from being a good source of daily vitamins and minerals.

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References

1. Gani MN. Impact of poultry litter on soil properties and production of Jute. Ph.D thesis. University of Dhaka, Bangladesh. 2014: 135.
2. Anonymous. Master for agricultural development in the southern region of Bangladesh, Ministry of agriculture. Government of the people's republic of Bangladesh & Food and Agriculture Organization of the United Nations. 2013: 104.
3. Oboh G. Characterization of the antioxidant properties of hydrophilic and lipophilic extract of jute (*chorchorus olitorius*) leaf. International journal of food sciences and Neutrino. 2009: 60: 124.
4. Islam MM. Biochemistry, Medicinal and Food values of Jute (*Corchorus capsularis* L. and *C. olitorius* L.) leaf: A Review. Intl. J. Enhanced Res. Sci. Technology Engineering. 2013; 2: 35-44.
5. Shittu TA and Ogunmoyela OS. Water blanching treatment and nutrient in some Nigerian green leafy vegetables. Proc. 25th Annual conference of the Nigeria Institute of Food Science and Technology, Lagos. 2001: 64-65.
6. Osonwa UE, Uronnachi EM, Umeyor CE and Onwuzuligbo CC. Physicotechnical Properties of Paracetamol Tablets Formulated with the Gum from the Fresh Leaves of *Corchorus olitorius*. Int. J. Pharmac. Sci. Res. 2012; 3: 2676-2679.
7. Okafor JC. Horticulturally promising indigenous wild plant species of the Nigerian forest Zone Acts. Hoticulturally. 1983; 123: 165-177.
8. Islam MT, Freitas RM, Sultana I, Mahmood A, Hossain JA, Homa Z, et al. A Comprehensive Review of *Corchorus Capsularis*: A Source of Nutrition, Essential Phytoconstituents and Biological Activities. J. Biomed. Pharmac. Res. 2013; 2: 1-8.
9. Mensah JK, Okokli RL, Ohaju-Obodo JO and Eifediy K. Phytochemical, nutritional and medical properties of some leafy vegetables consumed by Edo people of Nigeria. African J. Biotechnology. 2008; 7: 2304-2309.
10. Shipper RR and Budd L. African indigenous vegetables, Proceedings of the NRI/IPGR? CPRO workshop, 13-28 Jan. 1997. Limbe, Cameroon, ODA, UK. 1994.
11. Shipper RR. African indigenous vegetables: An overview of the cultivated species. Chattham. UK National resource instate/ACP EU Technical of agriculture and rural cooperation. 2000; 214.
12. Kaur KK, Kepoor K and Gupta AP. Impact organic manures with and without mineral fertilizer on soil chemical and biological properties under tropical condition. J. Plant Nutrition Soil Sci. 2005; 12: 1-52.
13. Hunter AH. Agro service international (ASI), A consultancy report on Soil fertility analytical services in Bangladesh, contract A.D/388-0051, I ADS/ BARC. 1984: 90.
14. Black CA. Methods of soil analysis, Part-2. Agron. Ser. Am. Soc. 1965; 9: 1149-1178.
15. Bray RH and Kurtz LT. Determining of total, organic and available forms of phosphorus in soils. Soil Sci. 1945; 59: 39-45.
16. Huq SMI and Alam MD. A hand book of Analyses of Soil, Plant and water, BACER-DU. University of Dhaka, Bangladesh. 2005; 22: 246.
17. Jones Benton J and Case Vernon W. Sampling, handling and analyzing plant tissue samples. In: R.L. Westerman (ed.), Soil Testing and Plant Analysis (3rd ed). SSSA Book Series No. 3. 1990.
18. Jackson ML. Soil chemical Analysis. Prentics Hall of India Pvt. Ltd. New Delhi. 1973: 498.
19. Hunt S, Groff LL and Holbrook J. Nutrition principles and chemical practice. John Wiley and Sons, New York.1980; 49-52: 459-462.
20. AOAC. Methods of Analysis of Association of Official Analytical chemists (21st ed). Washington, D.C. 1999; 1: 600-792.
21. Barakat MZ, Shaheb SK, Darwish N and Zahemy EI. Determination of

ascorbic acid from plants. Analyst Biochem. 1973; 53: 225-245.

22. Okwu DE and Josiah N. Evaluation of chemical composition of two Nigerian medicinal plants. African J. Biotechnology. 2006; 5: 357-361.

23. Alim MA, Alam MM, Khandker S, Ahmad SA, Huq A and Akhter N. Impact crop residues on soil organic matter content and the production of late jute seed. On line J. Biological Sci. 2001; 1: 1124-1126.

24. Gani MN, Alam AKMM, Khandker S and Ahmad S. Effect of poultry litter on physic-chemical properties of soil and yield of jute. Bangladesh J. Res. 1999; 1: 161-164.

25. Ayeni LS. Effect of sole and combined cocoa pod ash, poultry manure and NPK 20:10:10 fertilizer on soil organic carbon, available P and forms of nitrogen on alfisols in south western Nigeria. Interl Res. J. Agril. Sci. Soil Sci. 2011; 1: 77-82.

26. Küçük C and Tekgü YT. Effects of cotton stalk, maize stalk and almond bark on some soil microbial activities. Archives of Environmental Protection. 2017; 43: 91-96.

27. Khandker MM, Rahman H, Majid MA and Hossain AHMD. Influence of different organic manures on sugarcane productivity. Intro. Congress Conference of commission Iv. Dhaka, Bangladesh. 1992: 58.

28. Wang CH. Effects of Different Organic Materials on Crop Production under a Rice-Corn Cropping Sequence. Communications in Soil Science and Plant Analysis. 2013; 44: 20.

29. Sarkar MIU, Islam MN, Jahan A, Islam A and Biswas JC. Rice straw as a source of potassium for wetland rice cultivation,Geology, Journal Ecology, and Landscapes. 2017; 1: 184-186.

30. Robinson DS. Food biochemistry and nutritional value. Longman scientific and technical publisher, New York. USA. 1990; 52-58.

31. Mepha HD, Eboh L and Babigbo DEB. Effects of processing treatments on the Nutritive Composition and consumer acceptance of some Nigerian edible leafy vegetables. African Journal of Food & Agricultural Nutrition Development. 2007; 7: 1-18.

32. Brosnan J. Interorgan amino acid transport and its regulation. Journal of Nutrition. 2003; 133: 2068-2072.

33. Hassan LG and Umar KJ. Nutritional value of Baslam Apple (*Momordica Baslamina* L.) leaves. Pakistan J. Nutrition. 2006; 5: 522-529.

34. Okwu DE. Phytochemicals and vitamin content of indigenous spices of Southern Nigeria. J. Sustainable Agric Environment. 2004; 6: 30-37.

35. Akpanyung EO. Proximate and mineral composition of bouillon cubes produced in Nigeria. Pakistan J. Nutrition. 2005; 4: 327-329.

36. Latunde-Dada GO. Effects of processing on iron levels and availability from Nigerian vegetables. J. Sci. Food Agri. 1990; 53: 355-361.

37. Adeniyi SA, Ehiagbonare JE and Nwangwu SCO. Nutritional evaluation of some staple leafy vegetables in Southern Nigeria. International J. Agril. Food Sci. 2012; 2: 37-43.

38. Jute (*Corchorus capsularis* L. & *C. olitorius* L.) leaf: Vegetable for nutrition and medicine for human health and beauty.