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Effect of Spent Mushroom Substrate and Cowdung on Growth, Yield and Proximate Composition of Brinjal

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Abstract- A field experiment was conducted at the Research farm, Sher-e-Bangla Agricultural University, Dhaka-1207, Bangladesh, during the period from November 2011 to April 2012 to study the effect of spent mushroom substrate (SMS) and cowdung on growth, yield and proximate composition of brinjal (BARI Begun-6 and BARI Begun-8). Experiment was comprised of 5 treatments with three replications. The highest plant height (80.11cm, 75.56 cm), branch per plant (16.47, 18.80), the lowest days to first flowering (70.47 days, 70.20 days), the highest number of fruit per plant (7.4, 20.47), weight of individual fruit (262.3 g, 70.99 g), yield per plant (1.938 kg, 1.452 kg) and yield per ha (41.03 tons, 30.73 tons) were recorded in T_3 treatment for BARI Begun-6 and BARI Begun-8 respectively. In BARI Begun-6 and BARI Begun-8, the highest dry matter (7.59 %, 8.60 %), carbohydrate (3.46%, 4.07 %) and lipid (0.367 %, 0.425 %) were recorded in T_1 whereas the highest crude fiber (2.15%, 2.34 %) and protein (1.323 %, 1.42 %) were obtained in T_3 treatment and the highest ash content (0.337 %, 0.41 %) were found in T_2 treatment. On dry weight basis, in BARI Begun-6 and BARI Begun-8, the highest amount of Zn (1.879 mg %, 1.903 mg %) and Na (36.50 mg 536.69 mg %) was recorded in T_1 treatment whereas the highest P (272.6 mg %, 277.3 mg %), Ca (239.7 mg %, 235.4 mg %) and Fe (3.21 mg % 3.021 mg %) were found in T_2 and the highest K (282.4 mg) and Mg (186.4 mg %, 186.9 mg %) were obtained in T_3 treatment. The highest K (282.4 mg) in BARI Begun-6 was obtained in T_3 treatment and in BARI Begun- 8, the highest amount K (288.3 mg %) was obtained in T_2.

Index Terms- Egg plant, spent mushroom compost (SMC), proximate analysis, mineral composition.

I. Introduction

Brinjal or eggplant (*Solanum melongena* L.) is one of the most common vegetables grown in Bangladesh and other parts of the world. It is also a popular vegetable crop in France, Italy, USA, Mediterranean and Balkan areas (Bose and Som, 1986). It is thought to be originated in Indian sub-continent because of maximum genetic diversity and coldel related species of Solanum are grown in this region (Zeven and Zhukovensky, 1975). There are several varieties of brinjal grown in our country, such as Kazla, Zhumka, Nayantara, Islampuri, Uttara, Khotkhotia, Singnath, etc. All the varieties are not high yielding, some high yielding varieties in our country are BARI Begun-2, BARI Begun-4, BARI Begun-5, BARI Begun-6 and BARI Begun-8. Brinjal is the second most important vegetable crop next to potato in Bangladesh in respect of acreage and production (BBS, 2005). It is largely cultivated in almost all districts of Bangladesh. About eight million farm facilities are involved in eggplant cultivation (Islam, 2005). This gives small, marginal and landless farmers a continuous source of income and provides employment facilities for the rural people. Bangladesh is one of the most densely populated countries of the world. The land area for crop production is already low. Besides population growth rate in Bangladesh is high. Now we have to produce more food from less area to meet our demand. So our farmers are now using inorganic fertilizer such as Urea, TSP, MP etc. intensively to increase production. The importance of industrial fertilizers in developing modern farming practices and provision of food for the world wide population has been acknowledged. But, environmental pollution with excessive fertilizers with heavy metal contents is a global concern. Many of our agricultural lands have been over utilized by inadequate farming practice, and these results in nutrient depletion of soil (Jonathan *et al*., 2011a). In Bangladesh, most of the cultivated soils have less than 1.5% organic matter while a good agricultural soil should contain at least 2% organic matter. Moreover, this important component of soil is declining with time due to intensive cropping and use of higher dose of chemical fertilizers with little or no addition of organic manure in the farmer’s field. Evidences from different AEZ of the country have shown a decrease in the content of organic matter by the range of 15 to 30% over the last 20 years (Miah, 1994). Transformation of N, P and S in soil depends on the quality and quantity of organic matter as well as soil fertility and microbial activity. Nambiar (1991) views that integrated use of organic manure and chemical fertilizers would be quite promising not only in providing greater stability in production, but also in maintaining better soil fertility. There are different types of manure such as cowdung, farm yard manure (FYM) etc. that the farmers are using in their field. But as the farming system is being mechanized the aforementioned manures are now becoming unavailable day by day. Now we have to find some alternative sources those can be easily obtained at no cost or cheap rate. Fortunately, Spent Mushroom Compost (SMC) has many of the requisite attributes still left unexploited in place of cowdung and FYM in raising organic field crops and environment management. The SMC has been found to be a good nutrient source for agriculture mainly because of its rich nutrient status, high cation exchange capacity (CEC) and slow mineralization rate which retain its quality as an organic matter. Spent mushroom compost (SMC) also known as spent mushroom substrate (SMS) was defined as the leftover of wastes after different flushes of mushrooms have been harvested (Jonathan *et al*., 2011a). SMS when allowed as waste in the environment can serve as environmental pollution source thereby causes nuisance to the environment which is hazardous. But this hazardous effect can be turned around for fortune when used as a substrate for growing agricultural crops. Total mushroom production worldwide has increased more than 18 fold in 32 years, from about 350,000 metric tons in 1965 to about 6,160,800 metric tons in 1997 (Chang, 1999). The use of spent mushroom compost in growing agricultural crops has been recognized in recent times as a possible means of enhancing sustainable agriculture or production of food crops (Wang *et al.*, 1994). As the world drifts into practicing "Organic farming" in agriculture, the need to embrace the use of alternative manure, such as SMS should be encouraged. Hence, the study has been undertaken to find out the effect of Spent Mushroom Substrate on the growth, yield and proximate composition of brinjal.

II. MATERIALS AND METHODS

Experimental soil: The soil of the experiment field was silty clay loam. The morphological, physical and chemical characteristics of the soil are shown in the Table 1.

Table 1. Morphological characteristics of the experimental field

Morphology	Characteristics
Agro-ecological zone	Madhupur Tract (AEZ- 28)
General Soil Type	Deep Red Brown Terrace Soil
Parent material	Madhupur Clay
Topography	Fairly level
Drainage	Well drained
Flood level	Above flood level

(FAO and UNDP, 1988)

3.5 Materials used for the experiment

In this research work, seedlings of the variety BARI Begun-6 and BARI Begun-8 were collected from Horticulture Farm, Sher-e-Bangla Agricultural University, Dhaka-1207, Bangladesh and were used as planting material.

3.6 Design and treatment of the experiment

The experiment was conducted in Randomized Complete Block Design (RCBD) to achieve the desired objectives. The experiment was employed with two factors such as variety and fertilization with three replications.
Factor A: two varieties
V_1: BARI Begun -6 and V_2: BARI Begun - 8
Factor B: five fertilizations

T_1: Chemical fertilizer + Cowdung (10 t/ha), T_2: Chemical fertilizer + SMS (10 t/ha), T_3: Chemical fertilizer + Cowdung (5 t/ha) + SMS (5 t/ha), T_4: Chemical fertilizer, T_5: Cowdung (10 t/ha) + SMS (10 t/ha)

Here, Chemical fertilizer refers recommended dose of Urea @ 375 kg/ha, TSP @ 150 kg/ha and MP @ 250 kg/ha for Brinjal cultivation (BARI, 2011).

Transplanting and aftercare

Healthy and uniform sized seedlings of 30 days were taken separately from the seedbed and were transplanted in the experimental field on 21 November, 2011. The seedlings were transplanted maintaining 60 cm x 60 cm spacing. Seedlings were also transplanted around the border of the experimental plots for gap filling.

Harvesting

Harvesting was started in the first week of February, 2012 and was continued till 22 April, 2012. At each harvest, the weight of the fruits, number of fruits and individual weight of fruit was taken plot wise which was graduated in gram and kilogram.

Data collection

The data pertaining to following characters were recorded from uniform sized plant. Five plants were randomly selected to record the data. Data were collected on the following parameters Plant height (cm), Average number of branches per plant, Days to first flowering, Number of fruits per plant, Weight of individual fruit (g), Yield per plant (kg) and Yield per hectare (ton).

Proximate analysis of brinjal

Brinjal grown in different plots were collected treatment wise and all the wastes and dusts were removed from fruit. Then Dry matter, carbohydrate, crude fiber, protein, fat and ash were determined.

Determination of carbohydrate

The content of the available carbohydrate was determined by the following equation:
Carbohydrate (g/l00 g sample) = 100 - [(Moisture + Fat + Protein + Ash + Crude Fiber) g/100 g] (Raghuramulu *et al.,* 2003)

Determination of crude fiber

Crude fiber of the brinjal samples was estimated by using the method that reported by Raghuramulu *et al.*, 2003. Crude fiber (g/l00g sample) = [100-(moisture + fat)] x (We-Wa) / Wt. of sample

Determination of protein

The Protein contents of the brinjal were determined by the standard Micro-kjeldhal procedure of AOAC (1975). According to this method total nitrogen contents of the samples were estimated and proteins contents were find out by multiplying by 6.25 to the total nitrogen values.

Determination of fat

Fat was estimated as crude by ether extraction of the dried sample using the method that reported by Raghuramalu *et al.* (2003). The result was expressed as follows:

$$\text{Fat contents (g) per 100g of dried sample} = \frac{\text{Weight of ether extract} \times \text{Percentage of dried sample}}{\text{Weight of the dried sample taken}}$$

Determination of ash

Determination of Ash of brinjal samples were performed by using the method that reported by Raghuramulu *et al.*, 2003. According to this method five gram of the dried sample was weighed accurately into a crucible. The crucible was placed on a clay pipe triangle and heated first over a low flame till all the material was completely charred, followed by heating in a muffle furnace for about 5-6 hours at 600°C. It was then cooled in a dessicator and weighed. Ash was calculated as following equation:
Ash content (g/l00g sample) = Wt of ash × 100 / Wt of sample taken

Determination of minerals

Determination of total Nitrogen

The total nitrogen was determined by the Kjeldahl method of AOAC (1975), which depends upon the conversion of protein nitrogen into ammonium sulfate, by digestion. Ammonia liberated from the ammonium sulfate by making the solution alkaline was distilled into known volume of a standard acid, which was then back titrated.

Determination of Ca, Mg, K, Fe, Zn and P

The mineral contents were estimated by following standard procedure of AOAC (1975). The sample was digested with nitric acid to release of Ca, Mg, K, Na, Fe, Zn and P. Ca, Mg, Fe and Zn were determined by atomic absorption spectrophotometer, Na and K was determined by flame photometry and P was determined by spectrophotometer.

Statistical analysis

The data collected on various parameters were statistically analyzed using MSTAT-C package program to find out the treatment effect of the experiment. The mean values of all the treatments were calculated and analysis of variance (ANOVA) for all the characters was performed by the F-test (variance ratio). The significance of the difference among the treatments was determined by least significance difference (LSD) at 5% level of probability (Gomez and Gomez, 1984).

III. RESULTS AND DISCUSSION

Effect on plant height (cm): Plant height was significantly influenced by different treatments (Table 2). Maximum plant height of BARI Begun-6 (80.11 cm) and BARI Begun-8 (75.56 cm) were measured from T_3 where both SMS and cowdung were used with chemical fertilizer and minimum plant heights for both varieties were measured in T_5. The result of the present study corroborates with the study of previous researcher Ahlawat *et al.* (2007b) who reported that amendment of aerable land with 25 ton ha^{-1} of 6-18 months old naturally weathered SMS enhances plant growth of Shimla mirch (*Capsicum annuum*) in comparison to farm yard manure and the recommended dose of fertilizers.

Effect on number of branch per plant: Different treatments showed highly significant variation in the number of branch per plant (Table 2). Maximum number of branch per plant of BARI Begun-6 (16.47) and BARI Begun-8 (18.80) were produced by T_3 treatment. The minimum number of branch per plant was produced by T_5 treatment. The result of the present study corroborates with the study of previous researchers Olfati *et al.* (2012) who carried out a study with municipal solid waste compost, spent mushroom compost and cow manure applied to soil in which French dwarf bean (*Phaseolus vulgaris* L.) was planted. Organic fertilizer type affected number of branches.

Effect on days to first flowering: The days required for first flowering of plants was significantly influenced by different treatments (Table 2). The plant with treatment T_3 produced early flowering BARI Begun-6 (70.47 days) and BARI Begun-8 (70.20 days) and delayed flowering was occurred in the treatment T_5. The other treatments were statistically similar with T_3 in BARI Begun-6. The result of the present study corroborates with the study of Kr and Mordogan (2006) who reported that application of 20 t FYM/ha + green manure showed significant effect on the number of days to flowering from planting

Table 2. Effect of different treatments on growth attributes of Brinjal.

Treatments	Plant height (cm)				Number of branch per plant				Days to first flowering			
	BARI Begun - 6		BARI Begun - 8		BARI Begun - 6		BARI Begun - 8		BARI Begun - 6		BARI Begun - 8	
T_1	78.67	a	71.89	bc	14.60	ab	16.60	b	72.73	b	70.93	bc
T_2	79.44	a	73.22	ab	14.20	b	16.33	bc	73.53	b	72.27	bc
T_3	80.11	a	75.56	a	16.47	a	18.80	a	70.47	b	70.20	c
T_4	76.78	ab	71.00	bc	12.73	b	14.53	c	74.73	b	73.87	b
T_5	72.22	b	69.22	c	10.27	c	12.20	d	79.60	a	77.07	a
LSD (0.05)	4.646		3.397		1.897		1.851		4.361		3.035	
CV (%)	3.19		2.50		7.38		6.26		3.12		2.21	

In column, figures followed by different letter(s) indicate significantly different at 5% level of significance.

Effect on number of fruit per plant: It is evident from data presented in Table 3 that the average number of fruit per plant showed different results with different treatments and highly significant variation was recorded in respect of number of fruit per plant. The maximum number of fruit per plant of BARI Begun-6 (7.4) and BARI Begun-8 (20.47) were measured from T_3 and the minimum from the treatment T_5. The other treatments T_1 and T_2 were statistically similar with T_3 in BARI Begun-6. The present findings corroborated with the findings of Jonathan *et al.* (2013) who reported that SMC of *Pleurotus ostreatus* used as soil conditioner for the improvement of growth of Soyabean gave best result in respect of pod no.

Effect on weight of individual fruit (g): Significant variation was recorded in respect of weight of individual fruit (g) due to the application of different treatments (Table 3). The highest weight of individual fruit of BARI Begun-6 (262.3 g) and BARI Begun-8 (70.99 g) were measured from T_3 and the minimum from the treatment T_5. The other treatments T_1, T_2 and T4 were statistically similar with T_3 in BARI Begun-6. The present findings corroborated with the findings of Ahlawat *et al.* (2009) who reported that Mixing of soil with SMS enhances the tomato quality with respect to superior fruit weight.

Effect on yield per plant (kg): There was highly significant variation in yield per plant due to the application of different treatments (Table 3). The highest yield per plant of BARI Begun-6 (1.938 kg) and BARI Begun-8 (1.452 kg) were measured from treatment T_3 and the lowest was measured from T_5 treatment. The T_2 was statistically similar with T_3 in BARI Begun-6.

Effect on yield per hectare (ton): The data presented in the Table 3 showed highly significant variation in respect of yield per hectare. The maximum yield per hectare of BARI Begun-6 (41.03 tons) and BARI Begun-8 (30.73 tons) were measured from the treatment T_3 and the minimum yield per hectare was measured from the treatment T_5. The present findings corroborated with the findings of Ahlawat and Sagar (2007b) reported that mixing of SMS @ 25 ton ha^{-1} enhances the fruit yield of brinjal in comparison to FYM manured plots.

Table 3. Effect of different treatments on yield attributes of Brinjal.

Treatments	Number of fruit/ plant				Weight of individual fruit (g)				Yield/ plant (kg)				Yield/ha (ton)			
	BARI Begun - 6		BARI Begun - 8		BARI Begun - 6		BARI Begun - 8		BARI Begun - 6		BARI Begun - 8		BARI Begun - 6		BARI Begun - 8	
T_1	6.933	a	18.53	b	261.4	a	65.08	b	1.811	b	1.208	b	38.34	b	25.56	b
T_2	7.200	a	18.33	b	255.7	a	68.21	ab	1.840	ab	1.250	b	38.94	b	26.46	b
T_3	7.400	a	20.47	a	262.3	a	70.99	a	1.938	a	1.452	a	41.03	a	30.73	a

T_4	6.133 b	15.20 c	253.3 a	66.39 b	1.555 c	1.010 c	32.90 c	21.36 c
T_5	4.933 c	12.47 d	228.3 b	64.91 b	1.125 d	0.8093 d	23.82 d	17.13 d
LSD (0.05)	0.6013	1.156	12.55	3.628	0.1031	0.1031	2.0	2.277
CV (%)	4.90	3.61	2.64	2.87	3.04	4.99	3.03	4.99

In column, figures followed by different letter(s) indicate significantly different at 5% level of significance.

Effect on dry matter: The dry matter content of brinjal showed highly significant differences due to the application of different treatments (Table 4). The highest dry matter content of BARI Begun-6 (7.59 %) and BARI Begun-8 (8.60%) were observed in treatment T_1. The lowest dry matter content was in treatment T_4. The other treatments T_2, T_3 and T_5 were statistically similar with T_1 in BARI Begun-8. The present findings corroborated with the findings of Önal and Topcuoğlu (2007) who reported that application of SMC as an organic material source caused statistically important effects on dry matter contents in the pepper plant grown in greenhouse soil.

Effect on carbohydrate: The data presented in the Table 4 showed highly significant variation in respect of carbohydrate content. The maximum carbohydrate content of BARI Begun-6 (3.46 %) and BARI Begun-8 (4.07 %) were obtained from the treatment T_1. The minimum carbohydrate content BARI Begun-6 (3.28 %) and BARI Begun-8 (3.96 %) were measured from the treatment T_5 and T_4 respectively.

Effect on crude fiber: There was highly significant variation in crude fiber content due to the application of different treatments (Table 4). The maximum crude fiber content of BARI Begun-6 (2.15 %) and BARI Begun-8 (2.34 %) were measured from the treatment T_3. The minimum crude fiber content was measured from the treatment T_4. The present findings corroborated with the findings of Ahlawat *et al.* (2006a) who reported that amendment of nutritionally poor soil with aerobically recomposted SMS + chemical fertilizers enhances fibre of zinger in comparison to FYM mixed field.

Table 4. Effect of different treatments on Dry matter, Carbohydrate and Crude fiber content of Brinjal. (Fresh weight basis)

Treatments	Dry matter (%)		Carbohydrate (%)		Crude fiber (%)	
	BARI Begun - 6	BARI Begun - 8	BARI Begun - 6	BARI Begun - 8	BARI Begun - 6	BARI Begun - 8
T_1	7.59 a	8.60 a	3.46 a	4.07 a	2.13 b	2.33 ab
T_2	7.39 bc	8.59 a	3.31 c	3.97 c	2.12 bc	2.32 b
T_3	7.47 ab	8.56 a	3.33 b	3.99 b	2.15 a	2.34 a
T_4	7.24 c	8.39 b	3.29 cd	3.96 c	2.05 d	2.30 c
T_5	7.31 bc	8.50 a	3.28 d	3.98 bc	2.11 c	2.33 ab
LSD (0.05)	0.1684	0.1031	0.01883	0.01883	0.01883	0.01883
CV (%)	1.18	0.60	0.22	0.29	0.92	0.36

In column, figures followed by different letter(s) indicate significantly different at 5% level of significance.

Effect on protein: The amount of protein was significantly influenced by different treatments where BARI Begun-6 was insignificant (Table 5). In BARI Begun-6 the highest amount of protein (1.323%) was found in treatment T_3 and the lowest amount of protein (1.283 %) was found in T_5.

Effect on lipid: Highly significant variation was recorded in respect of lipid content due to the application of different treatments (Table 5). The maximum lipid content of BARI Begun-6 (0.367 %) and BARI Begun-8 (0.425 %) were measured from the treatment T_1. The minimum lipid contents were measured from the treatment T_4. The other treatments T_3 and T_5 were statistically similar to T_1 in BARI Begun-8.

Effect on ash: The ash content of brinjal showed highly significant differences due to the application of different treatments (Table 5). The maximum ash content BARI Begun-6 (0.337 %) and BARI Begun-8 (0.410 %) were measured from the treatment T_2. The minimum ash contents were measured from the treatment T_4. In BARI Begun-6 treatments T_1 and T_3 were statistically similar with T_2 and treatments T_3 was statistically similar to T_2 in BARI Begun-8. The present findings corroborated with the findings of Olfati *et al.* (2012) who reported that organic fertilizer type affected leaf ash percentage. Spent mushroom compost can be used as a substitute for cow manure in French dwarf bean production.

Table 5. Effect of different treatments on Protein, Lipid and Ash content of Brinjal. (Fresh weight basis)

Treatments	Protein (%)			Lipid (%)				Ash (%)			
	BARI Begun - 6		BARI Begun - 8	BARI Begun - 6		BARI Begun - 8		BARI Begun - 6		BARI Begun - 8	
T_1	1.303	b	1.403	0.367	a	0.425	a	0.323	ab	0.373	c
T_2	1.290	bc	1.400	0.327	bc	0.390	bc	0.337	a	0.410	a
T_3	1.323	a	1.420	0.338	b	0.413	a	0.320	ab	0.393	ab
T_4	1.287	bc	1.390	0.317	c	0.387	c	0.297	c	0.350	d
T_5	1.283	c	1.407	0.323	bc	0.407	ab	0.317	b	0.380	bc
LSD (0.05)	0.01883		0.01883	0.01883		0.01883		0.01883		0.01883	
CV (%)	0.94		0.94	2.03		0.81		2.20		0.88	

In column, figures followed by different letter(s) indicate significantly different at 5% level of significance.

Effect on potassium (K): The potassium content (mg/100g dry weight) of brinjal showed significant differences due to the application of different inputs in different treatments (Table 6). In BARI Begun-6 the highest potassium content (282.4 mg %) was found in treatment T_3 which way statistically similar to T_1 and T_2. In BARI Begun-8 the highest potassium content (288.3 mg %) was found in treatment T_2 which way statistically similar to T_3. The lowest potassium contents of both varieties were obtained in treatment T_5. The result of the present study corroborates with the study of Ranjini and Padmavathi (2013) who reported that use of SMS of *Pleurotus florida* alone or with *Azotobacter* increased potassium content of *Capsicum annuum*.

Effect on phosphorus (P): Highly significant variation was recorded in respect of phosphorus content due to the application of different treatments (Table 6). The highest amount of phosphorus in BARI Begun-6 (272.6 mg %) and BARI Begun-8 (277.3 mg %) were measured under treatment T_2 and the lowest phosphorus contents were showed by T_5. The result of the present study corroborates with the study of Wisniewska and Penkiewicz (1989) who reported that incorporation of SMS @ 50 t/ha in soil gave higher content of P in the onion bulbs.

Effect on calcium (Ca): The calcium content of brinjal was significantly influenced by different treatments (Table 6). Statistically similar but numerically highest calcium content of BARI Begun-6 (239.7 mg %) and BARI Begun-8 (235.4 mg %) were obtained from T_2 fruit followed by T_3. The treatment T_1, T_4 and T_5 contained statistically similar amount of calcium but their numerical order were $T_5 > T_1 > T_4$. The result of the present study corroborates with the study of Jonathan *et al.* (2012a) who showed that the calcium increases in potted pumpkin plants as the concentration of the SMC in the soil increases.

Effect on magnesium (Mg): There was highly significant variation in magnesium content due to the application of different treatments (Table 6). The highest magnesium content of BARI Begun-6 (186.4 mg %) and of BARI Begun-8 (186.9 mg %) were shown by T_3 treatment and the lowest magnesium contents were found in T_4 fruits. The result of the present study corroborates with the study of Wisniewska and Penkiewicz (1989) who reported that incorporation of SMS @ 50 t/ha in soil gave higher content of Mg in the onion bulbs.

Table 6. Effect of different treatments on K, P, Ca and Mg content (mg % of dry weight) of Brinjal.

Treatments	K (mg %)				P (mg %)				Ca (mg %)				Mg (mg %)			
	BARI Begun - 6		BARI Begun - 8		BARI Begun - 6		BARI Begun - 8		BARI Begun - 6		BARI Begun - 8		BARI Begun - 6		BARI Begun - 8	
T_1	276.7	ab	278.5	b	255.6	bc	263.4	c	205.7	b	201.3	b	170.3	b	174.8	b
T_2	278.1	ab	288.3	a	272.6	a	277.3	a	239.7	a	235.4	a	166.7	bc	168.7	bc
T_3	282.4	a	283.2	ab	258.2	b	268.7	b	227.1	a	225.8	a	186.4	a	186.9	a
T_4	271.6	bc	268.3	c	254.9	bc	260.3	c	204.0	b	198.8	b	159.7	c	163.0	c
T_5	266.3	c	263.0	c	253.3	c	256.4	d	206.6	b	200.0	b	167.2	bc	168.7	bc
LSD (0.05)	7.876		8.386		3.976		3.603		7.398		19.58		9.791		10.73	

CV (%)	1.52	1.61	0.82	0.72	4.94	4.90	3.06	3.30

In column, figures followed by different letter(s) indicate significantly different at 5% level of significance.

Effect on iron (Fe): Iron content of all the treatments were statistically similar (Table 7) but numerically highest iron content of BARI Begun-6 (3.210 mg %) and BARI Begun-8 (3.021 mg %) obtained by T_2 treatment and the lowest amount were shown by T_4.

Effect on zinc (Zn): Zinc content of BARI Begun-6 was in significant but in BARI Begun-8 zinc content significantly influenced by different treatments (Table 7). Numerically the highest amount of zinc in BARI Begun-6 (1.879 mg %) and BARI Begun-8 (1.903 mg %) were measured under treatment T_1 and the lowest amount was measured under T_5.

Effect on sodium (Na): The sodium content of brinjal showed highly significant differences due to the application of different treatments (Table 7). The highest sodium content of BARI Begun-6 (36.50 mg %) and of BARI Begun-8 (36.69 mg %) were measured under treatment T_1 which were statistically similar with T_5 and the lowest sodium contents were in treatment T_4.

Table 7. Effect of different treatments on Fe, Zn and Na content (mg % of dry weight) of Brinjal.

Treatments	Fe (mg %)		Zn (mg %)		Na (mg %)	
	BARI Begun - 6	BARI Begun - 8	BARI Begun - 6	BARI Begun - 8	BARI Begun - 6	BARI Begun - 8
T_1	2.976	2.870	1.879	1.903 a	36.50 a	36.69 a
T_2	3.210	3.021	1.753	1.766 ab	34.56 bc	34.69 bc
T_3	3.067	2.922	1.770	1.791 ab	35.13 b	35.91 ab
T_4	2.972	2.821	1.736	1.750 b	33.34 c	34.21 c
T_5	3.088	2.903	1.628	1.646 b	35.79 ab	36.20 a
LSD (0.05)	0.0595	0.1883	0.1575	0.1458	1.284	1.371
CV (%)	3.72	3.45	4.64	4.48	1.95	2.05

In column, figures followed by different letter(s) indicate significantly different at 5% level of significance.

IV. CONCLUSION

Plot treated with T_3 gave the best result in growth, yield and yield contributing characters in both variety of brinjal which was followed by plots treated with T_1 and T_2, statistically similar with each other. The highest dry matter (%), carbohydrate (%) and lipid (%) content in both varieties were recorded in plots treated with T_1. The highest crude fiber (%) and protein (%) in both varieties were recorded in plots treated with T_3 and the highest ash (%) content in both varieties was recorded in plots treated with T_2. The highest amounts of Zn and Na in both varieties were recorded in plots treated with T_1. The highest amount of P, Ca and Fe in both varieties was recorded in plots treated with T_2 and Mg in both varieties was recorded in plots treated with T_3.

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