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EFFECT OF DIFFERENT TYPES OF ORGANIC FERTILIZERS ON GROWTH AND YIELD OF MUKHI KACHU (*Colocasia esculenta*)

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ABSTRACT

The experiment was carried out to evaluate the effect of different organic fertilizers on growth and yield of Mukhi kachu. There were eight treatments consisting of T_0: Control, T_1: Cowdung @15t/ha, T_2: Cowdung @7t/ha, T_3: Poultrymanure @12t/ha, T_4: Poultry manure @6 tha^{-1}, T_5: Mustard oil cake @10 tha^{-1}, T_6: Cowdung @ 12tha^{-1}+ poultry manure @6tha^{-1} and T_7: Compost @15tha^{-1} were used in this investigation. Different organic fertilizers had significantly influenced on most of the growth and yield components of Mukhi kachu. The plant height, number of leaves $plant^{-1}$, number of suckers $hill^{-1}$, the length and breadth of leaf blade, number of cormel $hill^{-1}$, weight of corm, weight of cormel, yield of corm and cormel were the highest where poultry manures was applied. The yields of corms and cormels under T_3 treatment were 23.90 and 41.80 t ha^{-1}, respectively.
Key words: Mukhi kachu, organic fertilizer, yield.

Introduction

Mukhi kachu (*Colocasia esculenta* L. Schott), member of the family *Araceae* is one of the important edible aroid in Bangladesh. It is a popular indigenous vegetable of Bangladesh. The world area under aroid is 1.40 million hectares with an annual production of 8.687 million metric tons of marketable product (FAO, 1999).In Bangladesh, the production of aroids during 2012-2013 was 239 thousand metric tons, (BBS, 2014). Use of organic fertilizers is essential for proper growth and development of Mukhi kachu. Organic fertilizer improves texture, structure, humus, aeration, water holding capacity and microbial activity of soil and thus helps to increase and conserve the soil productivity. Soil fertility status of the country has been declining day by day which is now becoming a very alarming issue for the scientists and policy makers (Bhuiyan, 2005). The use of inorganic fertilizer is hazardous to human health, the soil environment and also expensive. On the other hand, organic matter is useful in maintaining or increasing the organic substances or nitrogenous compounds in soil. In this reason, it is necessary to find out an effective organic fertilizer for the cultivation of Mukhi kachu without polluting the soil and the environment. Considering the above facts, the present study was undertaken to observe the effect of different types of organic fertilizers on growth and yield of Mukhi Kachu and find out the most effective organic fertilizer for cultivation of Mukhi kachu.

Materials and Methods

The soil of the experimental plot was silty loam in texture belonging to the Old Brahmaputra Floodplain under the Agro-ecological Zone 9. In this research work, cormels of the Mukhi kachu were used as planting material. Average weight of each cormel was 35g. There were eight treatments consisting of T_0: Control, T_1: Cowdung @15t/ha, T_2: Cowdung @7t/ha, T_3: Poultrymanure @12t/ha, T_4: Poultry manure @6 tha^{-1}, T_5: Mustard oil cake @10 tha^{-1}, T_6: Cowdung @ 12tha^{-1}+ poultry manure @6tha^{-1} and T_7: Compost @15tha^{-1} were used in this investigation. The experiment was conducted following the Randomized Complete Block Design (RCBD) with 3 replications. The size of a unit plot was 2.5m × 2m. The experimental area was kept under careful observation and the following intercultural operations were done. Weeding, Gap filling,

Drainage, earthing up and insect controlled. The crop was harvested after 254 days of planting. Data were collected on different yield contributing characters and yield. Data recorded for different parameters studied were complied and tabulated for statistical analysis. Analysis of variance was done following Randomized Complete Block Design (RCBD) with statistical package MSTAT-C software developed by Russel 1986. The mean differences among the treatments were tested with Duncan's Multiple Range Test (Gomez and Gomez, 1994).

Results and Discussion

Effects on vegetative growth

Plant height: The plant height was significantly influenced by the application of different organic fertilizers at most of the DAP (Table 01). At 40 DAP; the effect of different treatments on plant height was insignificant. At 100 DAP; plant height was significantly influenced by the treatments. At that time, the highest plant height (80.50 cm) was observed from the T_3 treatment and the lowest (60.50 cm) from the control. The plant height was also significantly influenced by different treatments at 130, 160 and 190 DAP. The height plant height (52.52 cm) at 190 DAP was also obtained from the T_3 treatment and the lowest (32.00 cm) from the control. It might be due to higher nitrogen content in poultry manure and fertilizers were not applied in control plot. Plant height was increased with the increment of nitrogen level. Similar result was reported by Mohankumar and Sadanandan (1989). The response of poultry manure was most pronounced because it contain higher nitrogen and nitrogen enhances the protein synthesis, which allows plant to grow faster, rate of metabolism, cell division, cell elongation and stimulated apical growth.

Table 1: Effect of different organic fertilizers on plant height of Mukhi Kachu

Treatment	Plant height (cm) at different days after planting				
	40	100	130	160	190
T_0	12.05	60.50d	105.5d	87.10d	32.00d
T_1	12.55	79.01a	125.5ab	98.0ab	52.30a
T_2	12.25	66.00c	115.5cd	92.10bcd	33.80cd
T_3	12.80	80.50a	130.2a	100.0a	52.52a
T_4	12.25	64.50cd	111.2d	89.00cd	32.05d
T_5	12.30	70.30b	118.5bcd	92.00bcd	35.30c
T_6	12.40	72.98b	120.1bcd	94.50abc	42.50b
T_7	12.45	74.50b	122.0abc	95.00abc	43.05b
LSD 0.05	NS	4.342	2.169	1.783	2.215
CV (%)	3.62	3.43	4.17	3.96	3.91

Number of leaves plant^{-1}: Number of leaves plant^{-1} has shown in Table 2. Different organic fertilizers had no marked influence on the production of leaves per plant^{-1}. At 40 DAP, the maximum number of leaves plant^{-1} (1.95) was recorded from the T_3 treatment and the minimum number of leaves plant^{-1} (1.86) was obtained from the T_2 treatment and control. At 190 DAP, the maximum number of leaves plant^{-1} (2.23) was recorded from the T_3 treatment and the minimum number of leaves plan^{-1} (2.23) was obtained from the T_2 treatment. The number of leaves was increased up to 100 DAP. After 100 DAP, the number of leaves was decreased gradually because senescence was evident. Similar result was reported by Dhar (1989).

Number of sucker's hill^{-1}: Table 3 showed that the number of sucker hill^{-1} was influenced by different treatments. At 80 DAP; the maximum number of sucker hill^{-1} (8.34) was obtained from the treatment and minimum (6.68) from the control. At 200 DAP; the maximum number of sucker hill^{-1} (6.50) was obtained from the T_3 treatment and minimum (5.55) from the control. In all Cades the maximum number of sucker hill^{-1} was found in the T_3 treatment and the minimum was found in the control. It might be due to increased photosynthetic activity and translocation of photosynthetic to the corms which might have helped in initiation of more cormels.

Effect on yield components and yield: The numbers of cormels hill^{-1}, weight of corm and cormel weight were the important yield component of Mukhi Kachu. The size of the corm was much larger than the cormels (Table 4). The color of the cormels was pinkish at young stage and at harvesting stage was somewhat black. The different organic fertilizers were significantly influenced on number of cormel hill^{-1}, weight of corms, weight of cormels, yield of corms and cormels yield.

Table 2: Effect of different organic fertilizers on number of leaves plant^{-1} of Mukhi kachu

Treatment	Plant height (cm) at different days after planting				
	40	100	130	160	190
T_0	1.86	5.05	4.31	3.02	2.27ab
T_1	1.93	5.16	4.40	3.16	2.53a
T_2	1.86	5.07	4.32	3.03	2.23b
T_3	1.95	5.22	4.50	3.20	2.35ab
T_4	1.88	5.08	4.32	3.14	2.25ab
T_5	1.92	5.10	4.33	3.05	2.25ab
T_6	1.90	5.10	4.32	3.04	2.26ab
T_7	1.92	5.12	4.35	3.06	2.32ab
LSD 0.05	NS	NS	NS	NS	0.456
CV (%)	3.40	8.66	5.98	10.05	6.55

Table 3: Effect of different organic fertilizers on the number of sucker hill^{-1}of Mukhi kachu

Treatment	Plant height (cm) at different days after planting				
	80	110	140	170	200
T_0	6.68 d	8.20e	7.60d	5.35e	5.55b
T_1	7.43bc	9.27bc	8.21cd	6.71bc	6.10a
T_2	7.00cd	8.71d	8.06cd	6.33cd	6.13a
T_3	8.34a	9.88a	9.77a	7.50a	6.25a
T_4	7.17bcd	8.54de	8.15cd	6.22d	6.22a
T_5	8.15a	9.73ab	9.45ab	6.96b	6.50a
T_6	7.39bc	9.18c	8.12cd	6.85b	6.07a
T_7	7.63b	9.23c	8.71bc	6.95b	6.16a
LSD 0.05	0.482	0.463	0.791	0.463	0.446
CV (%)	3.70	2.92	5.31	3.99	4.15

Table 4: Effects of different organic fertilizers on yield components and yields on Mukhi kachu

Treatment	Average wt. of each corm (g)	Average wt. of each cormel (g)	Yield of corm (tha^{-1})	Yield of cormel (tha^{-1})
T_0	300.3 c	28.50 d	13.42 e	16.37 f
T_1	530.1 b	38.01 bc	20.70 bc	33.33 b
T_2	540.1 b	30.00d	16.23 de	20.33 e
T_3	615.5 a	43.37 a	23.90 a	40.80 a
T_4	535.6 b	35.67 c	22.60 ab	32.32bc
T_5	510.7 b	36.30 c	20.37 bc	25.27 d
T_6	510.0 b	38.33 bc	18.10 cd	29.42 c
T_7	600.0 a	40.50 ab	22.85ab	40.41 a
$LSD_{0.05}$	54.98	3.678	2.832	3.502
CV (%)	6.06	5.78	8.18	6.72

The maximum number of cormels hill^{-1} (26.33) was recorded from the T_3 treatment and minimum (10.0) from the control. The maximum weight of corm (615.5g) was obtained from the T_3 treatment and the minimum (300g) from control. The maximum weight of cormel (43.37 g) was obtained from the T_3 treatment and minimum (28.50) from the control. Similarly, the maximum yield of corms (23.90 tha^{-1}) and cormels (40.80 tha^{-1}) were obtained from the T_3 treatment and minimum yield of corms (13.42 tha^{-1}) and cormels (16.29 tha^{-1}) were recorded from the control. It might be due to higher nitrogen encouraged higher nitrogen uptake, vegetative growth, photosynthesis and then translocation of photosynthesis to the cormels.

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