

Plant Characters and Yield of Kohlrabi (*Brassica oleraceae* var. *gongylodes*) as Affected by Different Organic Manures

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Abstract: An experiment was conducted at Horticultural Farm of Sher-e-Bangla Agricultural University, Dhaka, Bangladesh during October-December, 2007 to study the effect of different organic manures on growth and yield of kohlrabi plant. Three types of organic manures viz., were compared with control (no manure) in the experiment. The maximum plant height (36.50 cm), plant canopy (63.50 cm), leaf length (30.42 cm), leaf breadth (14.25 cm), fresh leaves weight per plant (131.10g), diameter of knob (8.23cm), Knob weight (366.60 g), yield per hectare (22.90 t haG¹) were found in poultry manure application. Only the maximum number of leaves (20.00) was found in control treatment. On the other hand the minimum plant height (32.25 cm), plant canopy (55.75 cm), leaf length (24.92 cm), leaf breadth (10.75 cm), fresh leaves weight per plant (86.97g), diameter of knob (7.95 cm), Knob weight (177.50 g), yield per hectare (15.40 t haG¹) were found in control treatment. Minimum number of leaves (14.33) was found with cowdung application.

Key words: *Brassica oleraceae* % Cowdung % Poultry manure % Vermicompost % Yield

INTRODUCTION

Kohlrabi (*Brassica oleraceae* var. *gongylodes*) belongs to family Brassicaceae and considers as a cole crop and its edible portion is enlarged stem (knob). It is well known that, kohlrabi has enormous nutritional and medicinal values due to its high contents of vitamins (A, B₁, B₂, B₅, B₆ and E), minerals (Ca, Mg, Zn and Fe) and antioxidant substances which prevent the formation of cancer causing agents [1]. Kohlrabi is widely cultivated in European and American countries. Kohlrabi can be an alternative crop for vegetable growers due to its similarity to other Cruciferae members, having a short growing season and its export possibility. In Bangladesh, still it is grown in a very limited scattered areas and the total cultivated area is not exactly known. Organic matter is a source of food for the innumerable number of micro organisms and creatures like earthworm who breaks down these to micronutrients, which are easily absorbed by the plants. Organic manure plays a direct role in plant growth as a source of all necessary macro and micronutrients in available forms during mineralization, improving the

physical and physiological properties of soils. Organic manures such as cowdung, poultry manure and vermicompost improves the soil structure, aeration, slow release nutrient which support root development leading to higher growth and yield of kohlrabi plants [2]. The macronutrients calcium and micronutrients boron, manganese, molybdenum and iron are important for cole crop development. Biologically active soils with adequate organic matter usually supply enough of these nutrients. The aim of the investigation was to evaluate the growth and yield performance of kohlrabi cultivar (Sufala) under different organic manures.

MATERIALS AND METHODS

The experiment was conducted at Horticulture Farm in Sher-e-Bangla Agricultural University, Dhaka-1207 during October 2007 to December 2007. The area had sub tropical climate characterized by high temperature (28°-32°C) accompanied by moderately high rainfall during Kharif (April-September) season and low temperature (15°-20°C) in the Rabi (October-March) season. The soil

belongs to the “Madhupur Tract”, AEZ-28 [3]. Soil pH ranges from 5.4-5.6 and have organic carbon 0.82 %. The experiment was laid-out in Randomize Completely Block Design (RCBD) with five replications. Four types of organic manures viz., OM₀ = Control (no manure), OM₁ = Cowdung (30 t haG¹), OM₂ = Poultry manure (25 t haG¹) and OM₃ = Vermicompost (20 t haG¹) were used in the experiment. A high yielding kohlrabi cultivar ‘Sufala’ was used in this study. The seeds were sown on October 9, 2007 on raised bed maintaining the spacing of 45 cm × 30 cm. Irrigation and weeding was done at ten days interval. Other intercultural operations and pest management was done as per recommendation and whenever necessary. Randomly selected ten plants were harvested from each plot for data collection. Data were collected on plant height (cm), plant canopy (cm), number of leaves per plant, Leaf length (cm), leaf breadth (cm), weight of leaves per plant, Diameter of knob (cm), knob weight (g), yield (t haG¹). The means were separated by DMRT at 5% level of significance [4].

RESULTS AND DISCUSSION

Plant Height: Application of different organic manure exhibited a non significant influence on the height of kohlrabi plants. Plant height ranged from 32.25 cm to 36.50 cm. The highest plant height (36.50 cm) was recorded from poultry manure (OM₂) and the lowest (32.25 cm) was recorded from control plots (Table 1).

Plant Canopy: Organic manures exhibited a non significant influence on plant canopy of kohlrabi plants. Plant canopy ranged from 55.75 cm to 63.50 cm. The maximum plant canopy (63.50 cm) was recorded from poultry manure and the lowest (55.75 cm) was recorded from control treatment. Organic manures play a direct role in plant growth as a source of all necessary macro and micronutrients. Similar trend were coincided with those reported by Abou *et al.* [5].

Number of Leaves per Plant: Application of different organic manures exhibited a significant influence on the number of leaves of kohlrabi plants. Number of leaves per plant ranged from 14.33 to 20.00. The maximum number of leaves (20.00) was found in cowdung and the minimum (14.33) was found in control treatment. These results were coincided with those reported by Fong *et al.* (1996) and Abou *et al.* [2].

Leaf Length: Organic manures had a significant influence on the length of leaves of kohlrabi plants. Leaf length ranged from 24.92 cm to 30.42 cm. The largest leaf (30.42 cm) was recorded from poultry manure, which was statistically similar to that of vermicompost while the smallest leaf (24.92 cm) was recorded from control plots. In addition, organic manures are slow release nutrients all over the growth season. Poultry manure is rich in its nitrogen and nutrient content. This favorable condition creates better nutrient absorption and favors for vegetative growth. Consequently highest leaf length was found by poultry manure. The reports recorded by other investigators such as and Abou *et al.* [5].

Leaf Breadth: The leaf breadth of kohlrabi plant is important morphological character that influences the yield, because it is correlated with photosynthesis by the higher leaf area. Application of organic manures exhibited a significant influence on leaf breadth of kohlrabi plants. Leaf breadth ranged from 10.75 cm to 14.25 cm. The largest leaf (14.25 cm) was recorded from poultry manure, which was statistically similar to that of cowdung and vermicompost while the minimum leaf breadth (10.75 cm) was observed in control treatment. Poultry manure is rich in its nitrogen and nutrient content which enhance vegetative growth and photosynthetic activity of kohlrabi plants.

Fresh Weight of Leaves: Application of organic manures exhibited a significant influence on fresh weight of leaves of kohlrabi plants. Fresh weight of leaves ranged from 86.97g to 131.10 g. The maximum fresh leaves weight (131.10 g) was recorded from poultry manure, which was statistically similar to that of cowdung and vermicompost and the minimum fresh weight of leaves (86.97 g) was observed in control treatment. This might be due to poultry manure enhance its role in photosynthesis, energy storage, cell division and cell enlargement. Similar effects have been reported by Singh [6] and Sharma *et al.* [7].

Diameter of Knobs: Organic manures did not exhibit a significant influence on knob diameter of kohlrabi plants (Table 2). Knob diameter ranged from 7.95 cm to 8.23 cm. The maximum knob diameter (8.23 cm) was recorded from poultry manure while the minimum (7.95 cm) was observed without manure application. Poultry manure increased the knob diameter due to rich in its nitrogen and nutrients content.

Table 1: Effect of different organic manures on different plant characters of kohlrabi plants

Organic manures	Plant height (cm)	Plant canopy	No. of leaf	Leaf length (cm)	Leaf breadth (cm)
Control	32.25a	55.75a	14.33c	24.92b	10.75b
Cowdung	33.92a	57.00a	20.00a	26.42b	11.42ab
Poultry manure	36.50a	63.50a	17.25b	30.42a	14.25a
Vermicompost	34.75a	60.08a	14.42c	27.83ab	12.50ab
CV (%)	10.15	8.75	9.50	7.25	14.29

Means sharing common letters are not significantly different at $\alpha=0.05$

Table 2: Effect of different organic manures on fresh weight of leaves, knob diameter and knob weight on kohlrabi plants

Organic manures	Fresh weight of leaves plant ¹ (gm)	Diameter of knob (cm)	Knob weight (gm)
Control	86.97b	7.95a	177.50c
Cowdung	113.8ab	7.96a	241.46bc
Poultry manure	131.1a	8.23a	366.60a
Vermicompost	122.3ab	8.00a	316.93ab
CV (%)	14.71	13.10	12.20

Means sharing common letters are not significantly different at $\alpha=0.05$

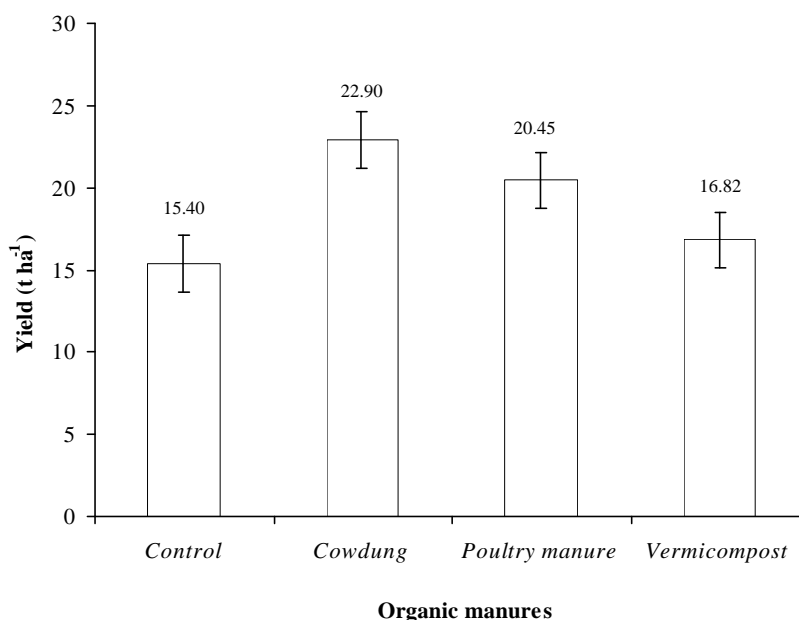


Fig. 1: Effect of different organic manures on yield of kohlrabi. (Vertical bars represents the standard error of means)

Knob Weight: Knob weight is important for increasing total yield. Application of different organic manures exhibited a significant influence on Knob weight of kohlrabi plants (Table 2). Knob weight ranged from 177.50 g to 366.60 g. The maximum knob weight (366.60 g) was recorded from poultry manure, which was statistically similar to that of vermicompost while the minimum (177.50 g) was observed in control plots. It was revealed that knob weight increased in poultry manure. This might be caused that Poultry manure contents high amount of nitrogen and nitrogen enhance photosynthesis, cell

division and cell enlargement. Similar trend of the results were reported by Balyan *et al.* [8], Sharma *et al.* [7], Singh [6] and Reddy *et al.* [9].

Yield: Application of different organic manures exhibited a significant influence on yield per hectare of kohlrabi plants (Fig. 1). Yield per hectare of kohlrabi plants ranged from 15.40 t to 22.90 t. The maximum yield (22.90 t) was recorded from poultry manure, which was statistically similar to that of vermicompost while the minimum yield (15.40 t) was observed without manure treated plots

(Fig. 1). The increase in the total yield resulting by organic manuring may be attributed to that organic manuring enhanced soil aggregation, soil aeration and increasing water holding capacity and offers good environmental conditions for the root system of kohlrabi plants. Poultry manure is rich in its nitrogen and nutrients content. These favorable conditions creates better nutrients absorption and favors the growth and development of root system which in true reflects better vegetative growth, photosynthetic activity. Consequently higher total yield would be obtained by poultry manure. The reports recorded by other investigators such as Abou *et al.* [5].

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