



Original Research Article

## Effect of Different Mulching on Growth and Yield of Tuberose

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### ABSTRACT

The study was conducted at the Horticultural Farm of Sher-e-Bangla Agricultural University, Dhaka, Bangladesh during the period from May 2013 to February, 2014. The experiment consisted three levels of mulch: M<sub>0</sub> - control, M<sub>1</sub> -Rice straw mulch and M<sub>2</sub> - water hyacinth mulch. The experiment was laid out in a Randomized Complete Block Design (RCBD) with five replications. Application of different mulches showed significant variations on most of the parameters. The highest yield of spike (3,46,290/ha) was found from M<sub>2</sub> and the lowest (3,07,140 /ha) from M<sub>0</sub>. So, water hyacinth mulch was found suitable for growth and yield of tuberose.

**Key word:** Tuberose, mulching materials, growth and yield.

### INTRODUCTION

Tuberose (*Polianthes tuberosa* L.) is one of the most popular bulbous ornamental plants of tropical and sub-tropical areas in the family Amaryllidaceae, produces attractive, elegant and fragrant white flowers. The flowers having excellent keeping quality and are widely used as cut flowers. The flowers remain fresh for quite a long time and stand long distance transportation and fill a useful place in the flower market. <sup>[1]</sup> It is used as vase decoration, bouquets, making veni, garland, button-holes or crown and frequently used during marriage or religious ceremonies. <sup>[2]</sup>

The long flower spikes of tuberose are excellent as cut flowers for table decoration when arranged in bowls and vases. The flowers emit a delightful fragrance and are the source of tuberose oil. The natural flower oil of tuberose remains today as one of the most expensive of the perfumes raw materials.

Tuberose is a native of Mexico from where it spreads to the different parts of the world during 16 century. How and when the tuberose found its entrance to India, Ceylon and elsewhere in the orient is probably an unanswerable question. <sup>[3]</sup> Now a days, it is cultivated on large scale in France, Italy,

South Africa, USA, and in many tropical and subtropical areas, including India and Bangladesh. In Bangladesh, for the last few years, tuberose has become a popular cut flower for its attractive fragrance and beautiful display in the vase. Now, it is one of the most important commercial cut flowers. Tuberose has high demand in the market and its production is highly profitable. In Bangladesh, its commercial cultivation was introduced during 1980 by some pioneer and innovative farmers at Panishara union of Jhikargacha thana under Jessore district near the Benapol border. Although tuberose is now grown in the country, very little is known about production technology in Bangladesh condition.

Tuberose is a half-hardy bulbous perennial multiplying itself through the bulblets. Roots are mainly adventitious and shallow, the leaves are long, narrow, linear grass like, green and arise in rosette, the flowers have a funnel shaped perianth, waxy white in color and borne in a spike. There are three types of tuberose: single with one row of corolla segments, semi-double bearing flowers with two to three rows of corolla segments and double having more than three rows of corolla segments.

Tuberose is known to be thermo sensitive crop and grown in Bangladesh all the year round. The role of mulching is well known on the growth and production of plants. Its vegetative growth, flower and bulb development are greatly influenced by growing environment. Due to long growing period it requires several irrigations. Mulching helps retaining moisture in the soil and sometimes even substitutes soil. [4] It protects the plants from loss of soil moisture by wind and soil evaporation and reduces the irrigation requirements. [4,5] Mulches help checking weed growth and improving the soil structure and fertility. [6] Mulches also help

proper utilization of all nutrients in the soil meeting up the requirements of irrigation and thus increase crop yield. Mulching is the common and cheapest method for the weed control. Weeds are major problem in agricultural production throughout the world. In order to maintain good yields of crops, weeds must be controlled. For these reasons mulching is more common in organic farming and its benefits include weed control, soil moisture conservation, and soil temperature moderation. [7]

There is a scope of increasing flower yield, quality of flower and bulb production of tuberose using mulch. Considering the present situations and above facts the present investigation was undertaken with the following objective to determine the effect of mulching on growth, flowering and yield of tuberose.

## **MATERIALS AND METHODS**

The experiment was conducted at the Horticultural Farm of Sher-e-Bangla Agricultural University, Sher-e-Bangla Nagar, Dhaka, Bangladesh. The location of the study site is situated in 23°74'N latitude and 90°35'E longitude. The experimental soil belongs to the Modhupur Tract under AEZ No. 28. [8] The selected experimental plot was medium high land and the soil series was Tejgaon. [9] The climate of experimental site was under the subtropical, characterized by three distinct seasons, the monsoon or the winter season from November to February and the pre-monsoon period or hot season from March to April and the monsoon period from May to October. [10] Bulbs of tuberose were used as planting materials and they were collected from Horticultural Farm of Sher-e-Bangla Agricultural University, Sher-e-Bangla Nagar, Dhaka- 1207, Bangladesh. The experiment consisted three levels of mulch: M<sub>0</sub> - control, M<sub>1</sub> -Rice straw mulch and M<sub>2</sub> - water hyacinth mulch. The experiment was

laid out in a Randomized Complete Block Design (RCBD) with five replications. There were 15 unit plots; the size of each was 2.0 m x 1.0 m. The experimental plot was opened in the first week of May 2013, with a power tiller and left exposed to the sun for a week. The sources of N, P<sub>2</sub>O<sub>5</sub>, K<sub>2</sub>O as urea, TSP and MP were applied. [11] The entire amounts of TSP and MP were applied during the final land preparation. Urea was applied in three equal installments at 30, 55 and 85 days after planting bulb of tuberose. The bulbs were planted on 20 May, 2013 with a distance on 20 cm x 20 cm and the number of bulb/plot was 50.

Data of plant height, number of leaves per plant, days required for emergence of spike, percentage of flowering plant, length of flower stalk at harvest, length of rachis at harvest, number of spikelet per spike, number of spike per hectare, individual bulb thickness, individual bulb weight, individual bulb diameter, number of bulblet per plant, weight of bulblet, diameter of bulblets, bulb yield per plot and hectare, bulblet yield per plot and hectare were recorded from the sample plants during the course of experiment. Ten plants were randomly selected from each unit plot for collection of data.

The experimental data obtained for different parameters were statistically analyzed. The mean values of all the recorded characters were calculated and analysis of variance was performed by 'F' (variance ratio) test. The significance of the difference among the individual and treatment combinations means was estimated by the Duncan's Multiple Range Test (DMRT) at 5% level of probability. [12]

## RESULTS AND DISCUSSION

### Plant height

Plant height of tuberose differed significantly due to the application of different mulch at days after planting of 30,

45, 60 and 75 (Figure 1). At 30, 45, 60 and 75 DAP the tallest plant (36.13 cm, 54.35 cm, 61.28 cm and 67.83 cm) was found from M<sub>2</sub> and the shortest plant (31.41 cm, 50.70 cm, 55.55 cm and 63.48 cm) was observed from M<sub>0</sub> for the same DAP, respectively. [13] Chaudhry *et al.* reported similar findings.

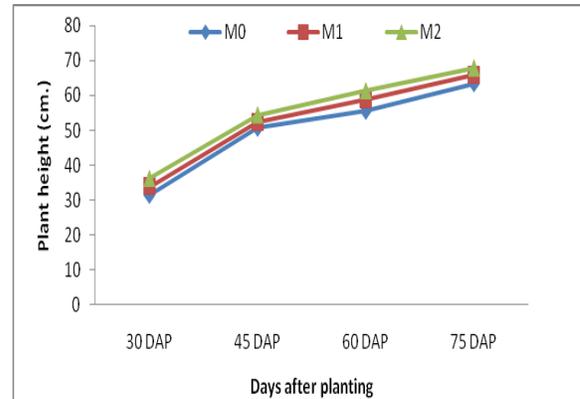


Figure 1. Effect of different mulches on pant height of tuberose

### Number of leaves per plant

Different mulch materials differed significantly on number of leaves per plant of tuberose at 30, 45, 60 and 75 DAP (Figure 2). At 30, 45, 60 and 75 DAP the highest number of leaves per plant (3.05, 6.03, 9.43 and 11.41) was recorded from M<sub>2</sub> and the lowest number of leaves per plant (2.59, 5.01, 7.71 and 9.45) was found from M<sub>0</sub> as no mulch i.e. control for the same DAP, respectively.

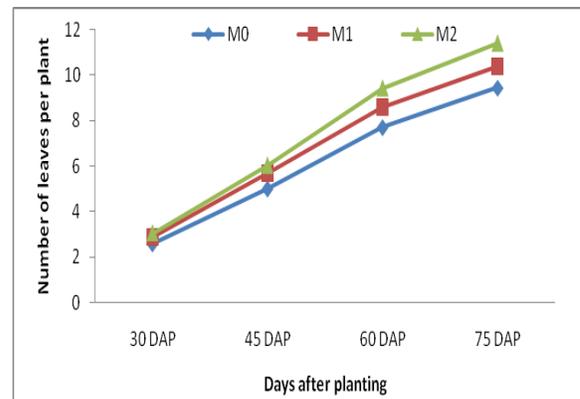


Figure 2. Effect of different mulches on number of leaves per plant of tuberose

### Days required to emergence of spike

Different mulch differed significantly for days required to emergence of spike of tuberose. The minimum days required to emergence of spike (58.73) was found from M<sub>2</sub> and the maximum days required to emergence of spike (60.40) was found from M<sub>0</sub> (Table 1).

### Flowering plant

Different mulches differed significantly for flowering plant of tuberose. The highest flowering plant (91.44%) was found from M<sub>2</sub>, whereas, the lowest flowering plant (81.11%) was recorded from M<sub>0</sub> (Table 1).

### Length of flower stalk at harvest

Different mulches showed significant variation for length of flower stalk at harvest of tuberose. The highest length of flower stalk at harvest (66.29 cm) was found from M<sub>2</sub> and the lowest length of flower stalk at harvest (59.81 cm) was obtained from M<sub>0</sub> (Table 1). Chaudhry *et al.* reported similar findings.

### Length of rachis at harvest

Length of rachis at harvest of tuberose varied significantly for different mulch materials. The highest length of rachis at harvest (34.23 cm) was found from M<sub>2</sub> and the lowest length of rachis at harvest (30.76 cm) was found from M<sub>0</sub> (Table 1).

### Number of spikelets per spike

Different mulch materials differed significantly on number of spikelets per spike of tuberose. The highest number of spikelets per spike (14.02) was found from M<sub>2</sub> and the lowest number of spikelets per spike (10.16) was recorded from M<sub>0</sub> (Table 1).

### Yield of spike per hectare

Yield of spike per hectare of tuberose differed significantly due to application of different mulch. The highest yield of spike per hectare (3,46,290) was observed in M<sub>2</sub> and the lowest yield of spike per hectare (3,07,140) was observed from M<sub>0</sub> (Table 1).

Table 1. Effect of nutrient sources and mulch on growth parameter of tuberose

Treatment	Days required to emergence of spike	Flowering plant (%)	Length of flower stalk at harvest (cm)	Length of rachis at harvest (cm)	Number of spikelets per spike	Number of spike per hectare (000)
M <sub>0</sub>	60.40 a	81.11 c	59.24 c	30.76 b	10.16 c	307.14 c
M <sub>1</sub>	59.0 b	88.76 b	63.81 b	33.14 a	13.00 b	334.94 b
M <sub>2</sub>	58.73 b	91.44 a	66.29 a	34.23 a	14.02 a	346.29 a
LSD <sub>(0.05)</sub>	0.700	22.156	1.701	1.164	0.803	17.86
CV (%)	6.58	7.31	9.60	4.76	8.66	6.33

In a column means having similar letter(s) are statistically identical and those having dissimilar letter(s) differ significantly as per 0.05 level of probability

### Weight of individual bulb

Different mulches differed significantly on the weight of individual bulb of tuberose. The highest weight of individual bulb (28.22 g) was observed in M<sub>2</sub> and the lowest weight of individual bulb (24.59 g) was found from M<sub>0</sub> (Table 2).

### Diameter of individual bulb

Different mulches differed significantly on diameter of individual bulb of tuberose. The highest diameter of individual bulb (2.05 cm) was found from

M<sub>1</sub> and the lowest diameter of individual bulb (1.70 cm) was observed from M<sub>0</sub> (Table 2).

### Number of bulblet per plant

Different mulch materials differed significantly on number of bulblet per plant of tuberose. The highest number of bulblet per plant (23.24) was found from M<sub>2</sub> and the lowest number of bulblet per plant (18.68) was obtained from M<sub>0</sub> (Table 2).

### Weight of bulblet per plant

Different mulch differed significantly for weight of bulblet per plant of tuberose. The highest weight of bulblet per plant (13.43 g) was recorded from M<sub>2</sub> and the lowest weight of bulblet per plant (11.48 g) was observed from M<sub>0</sub> (Table 2).

#### Diameter of bulblet

Different mulch differed significantly for diameter of bulblet of tuberose. The highest diameter of bulblet (1.36 cm) was found from M<sub>2</sub> and the lowest diameter of bulblet (1.21 cm) was attained from M<sub>0</sub> (Table 2).

#### Yield of bulb per hectare

Significant differences were found on yield of bulb per hectare of tuberose due to the use of different mulches. The highest yield of bulb per hectare (25.57 ton) was observed from M<sub>2</sub> and the lowest yield of bulb per hectare (18.38 ton) was attained from M<sub>0</sub> (Table 2).

#### Yield of bulblet per hectare

Yield of bulblet per hectare of tuberose showed significance variation for different mulch. The highest yield of bulblet per hectare (22.38 ton) was found from M<sub>2</sub> and the lowest yield of bulblet per hectare (17.28 ton) was found from M<sub>0</sub> (Table 2).

Table 2. Effect of nutrient sources and mulch on growth parameter and yield of tuberose

Treatment	Weight of individual Bulb (g)	Diameter of individual bulb (cm)	Number of Bulblet Plant <sup>-1</sup>	Weight of Bulblet Plant <sup>-1</sup> (g)	Diameter of bulblet	Yield of bulb (t/ha)	Yield of Bulblet (t/ha)
M <sub>0</sub>	24.59 b	1.70 b	18.68 b	11.48c	1.21c	18.38 c	17.28 b
M <sub>1</sub>	27.68 a	2.04a	22.74 a	12.78b	1.29b	25.53 b	20.92 a
M <sub>2</sub>	28.22 a	2.05 a	23.24 a	13.43 a	1.36 a	25.57 a	22.38 a
LSD <sub>(0.05)</sub>	0.655	0.067	0.712	0.471	0.047	1.939	1.819
CV(%)	5.26	6.50	7.42	5.01	5.06	11.25	12.04

In a column means having similar letter(s) are statistically identical and those having dissimilar letter(s) differ significantly as per 0.05 level of probability

## CONCLUSION

The highest yield of spike per hectare (3,34,940) was observed from M<sub>2</sub> and the lowest yield (3,07,140) was observed from M<sub>0</sub>. The highest diameter of individual bulb (2.05 cm) was found from M<sub>2</sub> and the lowest diameter (1.70 cm) was observed from M<sub>0</sub>. The highest diameter of bulblet (1.36 cm) was found from M<sub>2</sub> and the lowest diameter of bulblet (1.21 cm) was attained from M<sub>0</sub>. The highest yield of bulb per hectare (25.57 ton) was observed from M<sub>2</sub> and the lowest yield (18.38ton) was attained from M<sub>0</sub>. The highest yield of bulblet per hectare (22.38 ton) was found from M<sub>2</sub> and the lowest (17.28 ton) was found from M<sub>0</sub>. So, water hyacinth mulch was found suitable for growth and yield of tuberose.

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