

EFFECT OF MULCHING METHOD AND PLANTING TIME ON THE YIELD AND YIELD ATTRIBUTES OF TOMATO IN HILL SLOPE

Z. A. FIROZ¹, M. M. ZAMAN², M.S. UDDIN³ AND M. H. AKAND⁴

Abstract

An experiment was conducted at the Hill Agricultural Research Station, Khagrachari from September 2002 to February 2003 to find out the effect of mulching method (Mulching one month before planting, mulching just after planting and no mulching) and planting times (01 October, 16 October and 01 November) on the yield and yield attributes of tomato in hill slope. The highest yield (21.43 t/ha) was obtained from plant where mulch was given one month before planting. Among three planting times, the highest yield (15.27 t/ha) was obtained from 01 October planting. In case of combined effect, mulching one month before planting with 01 October planting produced the highest yield (28.06 t/ha) of tomato in hill slope.

Key Words: Mulching, planting time, tomato yield, hill slope.

Introduction

Tomato (*Lycopersicon esculentum* L.) is one of the important vegetable crops extensively grown during the winter season in Bangladesh. It has high nutritive value, especially in terms of vitamin "C" and "A" and minerals. Chittagong hill tracts region is about one-tenth of the total area of Bangladesh (Anon., 1985). This area has great potentiality for growing different crops by using high yielding varieties with improved production practices. But in winter season, soil moisture supply is limited in hill slope and vegetable production is very difficult. There is no irrigation facility in hill slope due to lack of water and high land. Mulching is effective in reducing evaporation, conserving soil moisture and has been known to modify the hydrothermal regime of soil (Bhagat and Acharya, 1988). Walter (1988) reported that the bad effects of water deficit could be overcome by irrigation or adopting *in-situ* moisture conservation techniques, such as use of mulches. Mulching has also been identified by many workers as a method to provide a favourable soil environment by minimizing crusting at the soil surface and keep it stable (Mehta and Prihar, 1973). Influence of mulching for tomato production has been reported by many researchers (Hooda *et al.*, 1999 and Monks *et al.*, 1997). To ensure the moisture supply mulch should be applied before the end of rainfall. This practice may increase the infiltration of rainwater and suppress the growth of weeds. Planting time also can play a vital role in producing tomato in hill slope in winter season. Many research works were conducted on planting time of tomato in plain area but no work was done in hill

¹⁻⁴ Agricultural Research Station, Raikhai, Chandraghona, Rangamati, Bangladesh.

slope condition. The present experiment was, therefore, undertaken to find out the effect of mulching method and planting time on moisture conservation and tomato production in hill slope.

Materials and Method

The experiment was conducted at the Hill Agricultural Research Station, Khagrachari from September 2002 to February 2003 to find out the effect of mulching method and planting time on the yield of tomato in hill slope (10-20% slope). There were three mulching methods viz., mulching before planting, mulching just after planting and no mulching and three planting times viz., 01 October, 16 October and 01 November. The experiment was laid out in randomized complete block design with three replications. In case of before planting mulching, mulching was given on first September by green sungrass, which are generally grown in hill slope. The thickness of mulch was 50 cm. But in case of after planting, dry sungrass was used with 15 cm thick layer. A heat tolerant variety, namely BARI Tomato-4 was used in the experiment. Thirty-day old seedlings were transplanted on above the mentioned dates in pit method. Plot size was 4m x 3m and spacing was 50cm x 40cm. There were six lines in each plot and 10 plants in each line. Fertilizers were used at the rate of 500, 400, and 250kg/ha urea, TSP, and MP, respectively. Intercultural operations were done as and when necessary. Data on yield and yield contributing characters were recorded and analyzed statistically. Nutrient status of experimental soil has been given in Table 3.

Results and Discussion

Effect of mulching on yield and yield attributes of tomato

The effect of mulching method on the yield and yield contributing characters is presented in Table 1. Plant survival (%), plant height, fruits/plant, average fruit weight, and yield were significantly affected by mulching method. Maximum plant survival percentage (77.8), plant height (97.2cm), number of fruits per plant (18.0), average fruit weight (35.4g), and weight of fruits per plant (644.1g) were recorded when mulch was given before planting tomato seedlings. The poor performance was observed in no mulching treatment. Fruit yield of tomato also showed similar trend (Fig. 1). The highest yield (21.47 t/ha) was recorded from pre-planting mulching. The highest fruit yield in pre-planting mulching might be due to conservation of soil moisture by stopping transpiration and weed control. Again post planting mulching was superior to no mulching. Similar findings were recorded by Elkner *et al.* (1991) in tomato, Lourduraj *et al.* (1997) in okra, Moitra *et al.* (1996) and Sharma and Parmer (1998) in wheat.

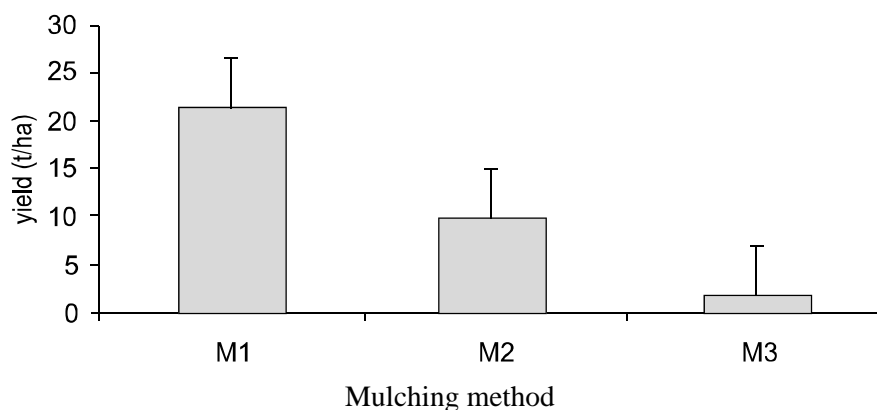


Fig. 1. Main effect of mulching method on fruit yield of tomato

M1= Pre-planting mulch, M2= Post planting mulch, M3= No mulch

Table 1. Main effect of mulching method and planting time on plant height and yield attributes of tomato in hill slope.

Treatments	Plant survival (%)	Plant height (cm)	No. of fruits/plant	Average wt of fruit (g)	Wt. of fruits/plant (g)
Mulching method					
Pre-planting	77.8	97.2	18.0	35.4	646.1
Post-planting	62.4	70.1	11.6	31.6	388.4
No mulching	36.6	52.8	5.7	17.4	109.3
LSD (0.05)	5.3	3.7	2.1	1.7	59.4
Planting time					
01 October	69.8	86.4	15.1	30.5	484.8
16 October	66.6	83.8	13.4	30.3	438.9
01 November	40.5	49.8	6.8	23.6	204.5
LSD (0.05)	5.3	3.7	2.1	1.7	59.4

Effect of planting time on yield and yield attributes of tomato

All the parameters studied in this experiment were significantly affected by planting time (Table 1). The highest plant survival percentage (69.8) was found from 01 October planting, while the lowest one was found in 01 November planting (40.50). The maximum plant height (86.4 cm) was recorded from 01 October followed by 16 October (83.8 cm) and the lowest one was recorded in 01 November (49.8 cm). Number and weight of fruits per plant, average fruit weight and fruit yield (t/ha) showed similar trend. The most satisfactory fruit yield

(15.27 t/ha) was found from 01 October followed by 16 October (13.41 t/ha) and the lowest one was found from 01 November planting (Fig. 2).

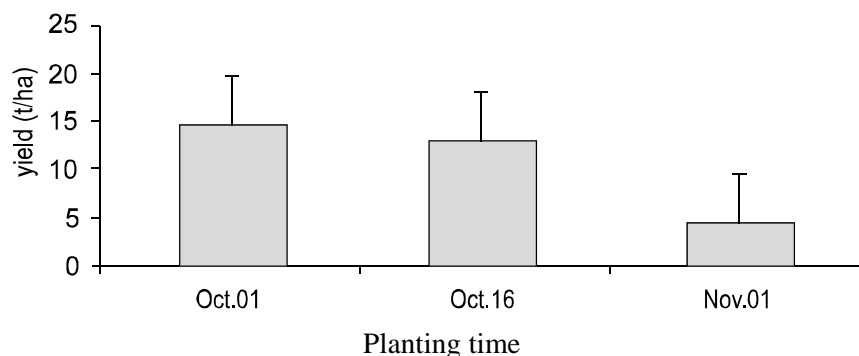


Fig. 2. Main effect of planting time on fruit yield of tomato

Combined effect of mulching and planting time

Interaction effect of mulching and planting time is presented in Table 2. The maximum survival percentage (92.7) was found from 1 October planting with pre-planting mulching, which was statistically identical to 16 October planting with same mulching method. Plant height, number and weight of fruits per plant also showed similar trend. Average fruit weight was the maximum (36.3g) in 01 October with pre-planting mulching, which was significantly at par with other October planting of same method. The highest fruit yield (28.02 t/ha) was obtained from 01 October planting with mulching before planting, which was statistically identical to 16 October planting with pre-planting mulch (24.8 t/ha) and the lowest yield (0.20 t/ha) was found from 01 November planting with no mulching (Fig. 3).

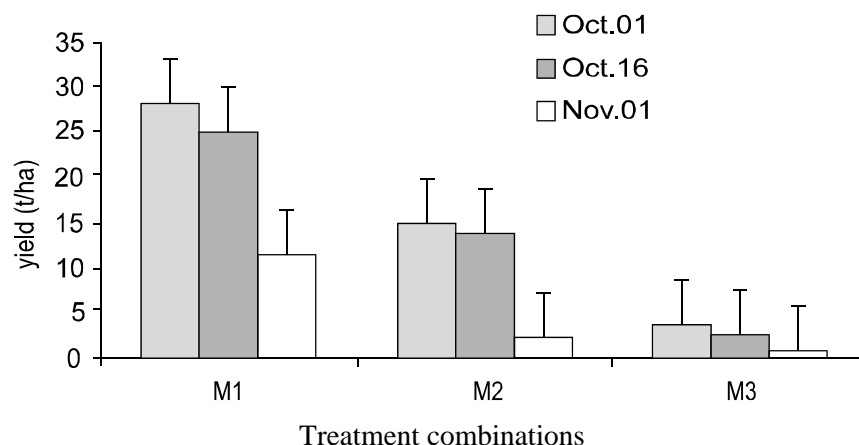


Fig. 3. Combined effect of mulching method and planting time of fruit yield of tomato

Table 2. Combined effect of mulching method and planting time on plant height and yield attributes of tomato in hill slope.

Treatment	Survival (%)	Plant height (cm)	No. of fruits/plant	Average fruit wt (g)	Wt of fruits/plant (g)
Pre-planting mulch					
01 October	92.7	119.1	20.5	36.3	747.7
16 October	90.8	113.3	18.8	35.8	684.0
01 November	49.9	59.5	14.7	34.1	506.7
Post-planting mulch					
01 October	69.5	77.4	16.2	36.9	532.4
16 October	65.6	75.9	15.0	36.3	514.5
01 November	52.2	56.9	3.5	21.5	71.5
No mulch					
01 October	47.2	62.9	8.5	18.2	174.3
16 October	43.3	62.5	6.3	18.8	118.4
01 November	19.4	33.0	2.3	15.2	35.3
LSD (0.05)	9.3	6.5	3.5	3.0	102.8

Table 3. Physico-chemical properties of 0-20 cm topsoil at the experimental plot.

Soil characteristics	Analytical value
Texture class	Clay loam
Soil pH	5.2
Organic matter (%)	1.35
Total N (%)	0.07
Exchangeable calcium (meq/100 g soil)	1.09
Exchangeable magnesium (meq/100 soil)	0.50
Exchangeable potassium (meq/100 g soil)	0.19
Available P (ppm)	4.2
Available S (ppm)	10.0
Available Cu (ppm)	2.2
Available iron (ppm)	170.0
Available zinc (ppm)	1.2
Available boron (ppm)	0.15
Available manganese (ppm)	13.0

Table 4. Monthly meteorological data recorded during the period of experiment.

Month	Temperature (°C) (Max.)	Temperature (°C) (Mm.)	Relative Humidity (%)	Rainfall (cm.)
September	32.5	28.4	83.3	19.5
October	32.3	27.5	82.8	10.6
November	29.3	19.8	79.9	-
December	26.2	18.5	8.5	3.8
January	22.9	14.5	83.8	-
February	27.3	17.1	81.9	-

It may be concluded from the above discussion that mulch has an advantage for better production of tomato in the hill slope. At the same time, pre-planting mulch with early planting time (01 October) is suggested for tomato production in hill slope condition.

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