

## PRODUCTION POTENTIALITY OF SUMMER TOMATO IN JAMALPUR REGION

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### ABSTRACT

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Present study analysed return of summer tomato cultivation by using the data collected from experimental plot in Regional Agricultural Research Station, Jamalpur. BARI released variety BARI Tomato-10 (*Anupama*) performed best with a per hectare yield of 28240 kg. To cultivate summer tomato in one hectare of land, total variable cost incurred BDT 292936 and total cost of production was BDT 297936. Gross margin was BDT 695464, net return or profit was BDT 690464 and benefit cost ratio (BCR) was 3.32. It can be concluded that cultivation of summer tomato is profitable for Jamalpur region.

**Key words:** Summer tomato, production and potentiality

### INTRODUCTION

Tomato (*Lycopersicon esculentum* Mill) is one of the most important and popular vegetables in Bangladesh. It is a good source of Vitamin A and C as well as providing antioxidant elements such as lycopene which prevents cancer (Bhutani and Kallo, 1983). Tomato is grown in winter months of Bangladesh as the temperature is congenial at that period of time for optimum growth and yield. But it has great potentiality to grow in summer also. Due to its palatability and vitamin content its demand in general is growing day by day through out the year, while its production is far from the requirements especially in summer season. In summer availability of vegetable is less due to agro-ecological constraints. Cultivation of summer vegetables is affected due to excessive rainfall, wind storm, etc. during the monsoon season. Therefore, special thrust is needed to increase summer vegetables production and thereby also increase cash flow to the farm family. Production of summer tomato is highly remunerative and need-oriented.

Year round tomato production in Bangladesh is constrained by many factors of which seasonality and multiple disease problems are the two main. Fruit setting in tomato is reportedly interrupted at temperature above 26/20 °C day/night respectively and often completely arrested above 38/27 °C day/night (Stevens and Rudich, 1978; El-Ahmadi and Stevens, 1979; Kuo *et al.* 1979). Charles and Harris (1972) stated that fruit setting of tomatoes need night temperature of 15 to 20 °C, which does not prevail any where in Bangladesh during May to September. In this context the Olericulture Division, Horticulture Research Center (HRC), Bangladesh Agricultural Research Institute (BARI) has developed two open pollinated (o.p.) varieties and two hybrid varieties of heat tolerant tomato. For fruit setting o.p. varieties require hormone application which is highly technical, cumbersome, cost intensive and unavailable at farmers level. Ahmad (2002) found that only by selection from o.p. materials of tomato, this genetic barrier cannot be overcome successfully. Through genetic manipulation by combining different partially heat tolerant genotypes is only the way to achieve a break through in this respect. It is reported that heterosis in tomato resulted an increased yield of 20 % to 50 % (Chowdhury *et al.* 1965). Tesi *et al.* (1970) reported that apart from high yield the F<sub>1</sub> hybrid have specific advantages of higher yield, fruit number, fruit size, uniformity, improved quality, adoption of adverse condition etc. He further mentioned that exploitation of hybrid vigour in tomato is economical because each fruit contains larger number of seeds as compared to other vegetables.

Some selected tomato hybrids are capable of growing tomato during summer season without hormone application. Now-a-days farmers of Bangladesh are very much fascinated to grow hybrid tomato to avoid hormone application, to get early harvest with good quality bigger size fruit. Considering the above facts, the present study was under taken to evaluate the performance of some selected hybrid tomato and analysed the agro-economic factors in relation to yield and return of experimental plot for summer tomato cultivation in Regional Agricultural Research Station, Jamalpur.

### MATERIALS AND METHODS

The data used for the present paper was taken from the experiment entitled "Regional yield trial of a newly developed summer hybrid lines of tomato" which was conducted at Regional Agricultural Research Station, Jamalpur in 2004.

The experiment was conducted with four hybrid tomato lines and two Bangladesh Agricultural Research Institute released variety, BARI Tomato- 10 (*Anupama*) and BARI Tomato- 13 (*Shrabony*), which do not require applying artificial hormone application.

The study was conducted at RARS, Jamalpur during kharif season of 2004. After ploughing, harrowing and levelling of land, raised bed (15 cm high) was prepared. The bed size was 4.0 × 1.0 m. accommodating 20 plants in each bed having 60×40 cm plant spacing. Between two beds 30 cm was left for irrigation, intercultural operations etc. The seeds of summer hybrid tomato lines were sown on May 5, 2004. Thirty days old seedlings were transplanted in the field under transparent polyethylene shed tunnel. The size of transparent polyethylene shed tunnel was 20×2.3 m accommodating 200 tomato plants. One hectare of land accommodates such 170 polytunnel shed (Ahmad *et al.* 2004). Transparent polyethylene shed was prepared with bamboo stick support for normal growth, establishment and development of summer tomato. The bamboo stick was provided for supporting the tomato plants to protect from lodging. Fertilizer application, intercultural operations and plant protection measures were done as and when necessary. Data were recorded on different yield and yield contributing characters and analysed statistically following mean comparison of with MSTATC. Calculated marketable tomato yield per hectare was computed considering 80 percent plant were capable to produce marketable yield. Harvesting of tomato was done from August 19 to September 22, 2004.

## RESULTS AND DISCUSSION

### *Yield and yield components*

Data on different yield contributing characters and yield are presented Table 1. Plant height ranged from 1.39 m to 1.98 m. The tallest plant (1.98 m) was produced by the F<sub>1</sub> line C-21×41 while the shortest (1.39 m) in BARI Tomato-13 (Shrabony). BARI Tomato-10 (Anupama) produced the highest numbers of fruits per plant (37.69) and yield (28.24 t/ha) with an average fruit weight of 19.97g. The second highest yield (28.15 t/ha) with an average fruit weight of plant 28.21g was obtained from the F<sub>1</sub> line C-41×71. The other three F<sub>1</sub> lines (C-61×71, C-11×51 and C-21×41) produced yield of 17.46 t/ha, 17.85 t/ha and 22.29 t/ha, respectively. BARI Tomato-13 (Shrabony) produced the tomato yield (22.46 t/ha).

Table 1. Yield and yield contributing characters of summer hybrid tomato lines

F <sub>1</sub> Lines/Varieties	Plant height (m)	Fruits/plant (no.)	Average fruit wt. (g)	Yield/ plant (g)	Calculated yield (t/ha)
C-61×71	1.92 b	24.00 cd	27.44 ab	557.3 c	17.46
C-11×51	1.83 c	16.34 d	31.48 a	602.3 bc	17.85
C-21×41	1.98 a	27.13 bc	25.13 b	664.0 bc	22.29
C-41×71	1.90 b	32.92 abc	28.21 ab	882.8 a	28.15
BARI Tomato-13 (Shrabony)	1.39 d	36.59 ab	16.91 c	667.3 bc	22.46
BARI Tomato-10 (Anupama)	1.91 b	37.69 a	19.97 c	720.0 b	28.24
CV (%)	5.99	22.65	13.44	15.36	-

From the Table 1, we found that the yield ranged of hybrid tomato lines varied from 17.46 t/ha to 28.24 t/ha, while the national average yield of tomato is 6.64 t/ha (Anonymous, 2003). So there is a bright scope to increase tomato yield in summer season to incorporate these hybrid lines of tomato under polytunnel shed. People choose the locally produced mixed coloured tomato (greenish-yellow) than imported artificially ripened bright -yellow, hard tomato. Even they were ready to pay more BDT 5 to 10 per kg to buy for the local tomato than the imported tomato. Best yield performed variety BARI Tomato- 10 (*Anupama*) was considered to analyse its profitability. In next section, cost and return analysis for summer tomato was done only considering the variety *Anupama*.

### *Input Use*

Human labour required per hectare was 578 man-days, which can be provided from the farmer's own family (Table 2). To cultivate summer tomato in one hectare of land, BDT 2,435 for power tiller cost to prepare land, 200 gm seed, 649 number *talla bash* (bamboo), 974 number *barbasha* (bamboo), 3571 yard polyethylene, 203 kg nylon rope, 284 kg jute rope, 10000 kg cowdung, 306 kg Urea, 170 kg TSP and 170 kg MP as well as BDT 20292 for insecticide were spent. Fertilizers were computed excluding border, drainage, footpath etc.

### *Cost of production*

Table 2 shows that total variable cost of production and total cost of production for summer tomato was BDT 292936 and BDT 297936 in one hectare of land, respectively. Supportive materials like bamboo can be used easily for two years. For this reason, half of the market value of bamboo was taken into consideration to calculating cost. Highest cost was incurred for Polyethylene (46 percent of total cost), and then for human labor (15 percent of total cost) and bamboo (13 percent of total cost). Farmers can provide human labor from their own family, as at the time of summer tomato cultivation (June to September) labor is available in rural village.

By using home supplied family labor, they can reduce cash cost BDT 43350 per hectare and there by increase gross margin from BDT 695464 to BDT 739742.

Table 2. Per hectare cost and return from summer tomato cultivation at experimental plot

Particulars	Unit	Quantity	Value (BDT)
Human labour	Days	578	43350
Power tiller	BDT	2435	2435
Seed	gm	200	600
Bamboo ( <i>Talla bash</i> )	No.	649	9740
Bamboo ( <i>Barbasha</i> )	No.	974	29221
Polyethylene	yard	3571	135698
Nylon (Rope)	Kg	203	20300
<i>Sutlee</i>	Kg	284	8520
Cowdung	Kg	10000	10000
Urea	Kg	306	1836
TSP	Kg	170	2550
MP	Kg	170	2380
Insecticide	BDT	20292	20292
Int on operating capital	BDT	5978	5978
Total Variable Cost (TVC)	BDT		292936
Rental value of land	BDT		5000
Total Cost (TC)	BDT		297936
Total production/Gross Return	Kg	28240	988400
Gross margin	BDT		695464
Net Return	BDT		690464
BCR			3.32
BCR(Based on TVC)			3.37

### Return from Summer Tomato

The total yield for summer tomato was 28240 kg per hectare and gross return was BDT 988400. By cultivating summer tomato in one hectare of land, gross margin was BDT 695464 and net return or profit was BDT 690464. The benefit cost ratio (BCR) was 3.32 and ratio of benefit to total variable cost was 3.37.

### Sensitivity analysis

The cost and return from cultivating summer tomato which is shown in Table 2, has been reworked separately in this section to ascertain the changes in the profitability of summer tomato under varying conditions. Assuming all costs of summer tomato cultivation constant but yield or price of tomato down at the rate of 10 to 20 percents - then what would be the consequences.

The results of sensitivity analysis considering the above circumstances are depicted in Table 3. It is evident from Table 3 that BCR of summer tomato cultivation is greater than the unity and gross margin is also reasonable. This implies that if the return decreases at 10 to 20 percent while the cost of summer tomato cultivation remains unchanged, cultivation of summer tomato is still profitable for the farmers.

Table 3. Sensitivity analysis of summer tomato cultivation

Situation	BCR	Gross margin
Current situation	3.32	695464
Decrease of yield or price of tomato		
10% level	2.99	596624
20% level	2.65	497784
Decrease of both yield and price of tomato		
10% level	2.69	507668
20% level	2.12	339640

It is apparent from the above discussion that cultivation of summer tomato is suitable for Jamalpur region. Although, under this crop, a huge amount of cash is needed, farmers obtained higher amount of profit. Extension workers can, therefore, encourage farmers to cultivate summer tomato. Government also is benefited to save the hard-earned foreign currency that was spent to import summer tomato. Summer tomato cultivation was highly profitable but the major constraint is the initial cost for bed and polyethylene shed preparation. In order to overcome this constraint, it is necessary to provide credit with easy terms and conditions. Non-Government Organization (NGO), who works to raise the income of small farmers throughout the year in rural areas, can

adopt the technology for their target groups. As the summer tomato variety is BARI Tomato-10 (Anupama), so, government has to take necessary action to ensure availability of its seed in the market in the primary stage of its adoption.

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