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FERTIGATION INFLUENCE ON THE YIELD AND QUALITY OF STRAWBERRY

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ABSTRACT

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The interactive effects of irrigation and fertilizers on the yields of BARI Stb.-1 and FA-016 were assessed at the central research station, Joydebpur during the *rabi* season of 2012-2013. Two drip irrigation levels i.e., alternate day and two days interval and three fertilizer doses *viz.*, $N_{110}K_{110}P_{40}S_{25,}$ $N_{90}K_{90}P_{40}S_{25}$ and $N_{70}K_{70}P_{40}S_{25}$ with two different strawberry varieties were tested. Soluble fertilizers like N and muriate of potash were applied with water through drip irrigation system. First irrigation and fertilizer application were done at 30 and 32 days after transplanting (DAP), respectively. The cumulative effects of irrigation water, fertilizer doses and varieties are noticed that the lowest fertilizer dose ($N_{70}K_{70}P_{40}S_{25}$), alternate day irrigation and FA-016 strawberry variety produced highest yield and it might be suitable for strawberry cultivation in Joydebpur but it required longer cropping season (100 days) than that of BARI Stb.-1. Regarding the fruit quality, BARI Stb.-1 obtained higher TSS but had lower p^H and Vitamin-C as compared to the FA-016. The seasonal water use varies from 422.3 to 606.6 mm for a better yield (176.44 to 761.60 g/plant) in Joydebpur under normal rainfall condition. The highest benefit cost ratio was seen in the variety of FA-016 (9.79) than that of BARI Stb.-1 (3.38) utilizing with alternate day irrigation and low fertilizer doses in both variety.

Key words: *fertigation, variety, yield, quality, seasonal water use, economic analysis*

INTRODUCTION

Strawberry is very popular to all irrespective of sexes and ages over the world. It has been cultivated in Bangladesh successfully at farmer's field of 45 districts including some locations of Sylhet (Rahman *et al.* 2012). Strawberry is a delicious small fruit widely appreciated mainly for its characteristic aroma, bright red color and it rich in Vitamin C, fiber, folic acid and potassium (Rajendra 2010). It has been widely grown world-wide because of its ability to adapt to various ecological conditions. Prerequisites for a successful strawberry yield are climate and soil. Specific nutrient management practices are suggested for individual cultivars grown under these widely different environmental conditions to ensure large yields of quality fruit (May and Pritts, 1990).

Until 1990, most strawberries were irrigated with sprinkler systems and all P and micronutrients and 25% of the N and K were incorporated in the bed soil. The remaining N and K were banded in the center of the bed 6 cm deep between the two rows of strawberry plants (Albregts and Howard, 1984; Hochmuth 1988). Strawberry producers have recently changed from sprinkler to drip irrigation to benefit from the water application efficiencies of drip irrigation (Albregts *et al.* 1990; Locascio and Myer, 1975). Although drip irrigation has been shown to provide substantial water efficiencies, there is limited information on fertilizer use with drip irrigated strawberries (Hochmuth *et al.* 1996).

Fertigation is the application of water soluble solid fertilizer or liquid fertilizer through drip irrigation system. It has become an effective method of fertilization in modern intensive agriculture systems. This has assumes added importance after the introduction of micro-irrigation system like drip in irrigated agriculture. For minimizing the cost of irrigation and fertilizers, adoption of drip irrigation with fertigation is essential which will maximize the nutrient uptake, while using minimum amount of water and fertilizer. Fertigation gives advantages such as higher use efficiency of water and fertilizer, minimum losses of N due to leaching, supplying nutrients directly to root zone in available forms, control of nutrient concentration in soil solution and saving in application cost. Thus, the fertigation becomes prerogative for increasing the yield of the crops under drip irrigation. NPK is very important mineral elements in strawberry growing (Kessel 2003). Therefore, a proper nutrition program for strawberry including NPK is important in terms of yield, field quality and in preventing environmental pollution and wasteful expenditure. For this reason, it is important to know the range of climates, soil physicochemical conditions, genotypes and cultural practices affect nutrient uptake from the soil (Mengel and Kirkby, 1982).

At present, it is proven that the irrigation and fertigation levels are major factors that mainly govern the productivity of crop. Among the methods used for irrigation, specially pressurized irrigation systems are being improved and released frequently to achieve maximum productivity of crop because of scarcity of water and valuable soluble fertilizers (Rajendra 2010). In Bangladesh, many farmers and entrepreneurs are cultivating strawberry using various methods of irrigation with different doses of fertilizer in their crop fields. The use of proper irrigation and micro-nutrients along with NPK would be a feasible technology for harvesting higher yield and quality of strawberry. The information available in Bangladesh condition is very limited. In context of

above theme, the experiment was undertaken to find out the right amount of irrigation water and fertilizer doses for optimum yield of quality strawberry using two different varieties.

MATERIALS AND METHODS

Experimental site

The experiment was conducted during the *rabi* season of 2012-2013 at the experimental field of Irrigation and Water Management Division, Bangladesh Agricultural Research Institute, Joydebpur, Gazipur. The soil of the experimental field was sandy clay loam with p^H 6.49. The field capacity and wilting point were 28.5%, 14.4% (wet basis), respectively. The bulk density was 1.50 g/cc. There were two irrigation levels, three different fertilizer doses and two strawberry varieties in the experiments.

Experimental design and treatment

The experimental plot was set in split-split design with three replications. The unit plot size was 2 m × 2.4 m with recommended plant spacing of 60 cm × 40 cm. Fertilizer doses are placed in sub plot and irrigation schedules are the main plot.

In this experiment, there were two levels of irrigation *viz*., drip irrigations at an alternate day (I_1) and drip irrigation at two days interval (I_2); and three different levels of fertilizer doses such as high (F_1=$N_{110}K_{110}P_{40}S_{25}$), medium ($F_2$=$N_{90}K_{90}P_{40}S_{25}$) and low ($F_3$=$N_{70}K_{70}P_{40}S_{25}$) were used. Two strawberry varieties *viz*., BARI Stb.-1(V_1) and FA-016 (V_2) were used as plant material. There were six treatments *viz.*, drip irrigation at an alternate day with high, medium and low fertilizer doses T_1, T_3 and T_5, respectively and drip irrigation at two days interval using same fertilizer doses T_2, T_4 and T_6, respectively. The irrigation treatment was started just after establishment of seedlings.

Total amount of potassium in the form of triple super phosphate and other micronutrients were applied during final land preparation while the different doses of N and K in the form of urea and muriate of potash, respectively were applied with irrigation water into 4 equal splits. Cowdung was applied at the rate of 5.0 t/ha. The mixing ratio of fertilizer and water was 1:140. First fertigation was applied on December 2, 2012 and another three were applied after 20 days interval.

Cultivation procedure

First, the soil is ploughed during summer with a soil turning plough which is followed by repeated ploughing to make soil friable, remove weeds and stubbles. Then, the seedlings of 20-25 days old were transplanted on 31 October 2012. The soil is frequently irrigated to reduce water stress in the leaf. The average dripper discharge was 4.3 liters/hr on an optimum condition. Irrigation was applied through drip system as per treatments to meet the crop evapotranspiration. After one month of transplanting, paddy straw at the rate of 5.0 t/ha was used for mulching to minimize soil temperature, conserve soil moisture, control weeds and keep the fruits off the soil. Runners of strawberry plants were removed 2/3 days after emergence. Weeding and spraying of insecticides (Kinalux 25 EC, 2 ml/liter and Sevin powder) were done as and when necessary. In open field experiment, crop faces severe attack of birds, insect, disease and pest. In this direction, netting is the best alternative and used it for quality and quantity production. Proper monitoring was continued and data were recorded during different stages of crop growth as well as timing of fruit harvest. Fully ripen fruits were harvested from 2 January to 31 March, 2013.

Statistical analysis

The different yield parameters such as fruit length, diameter and weight, number of fruit grown and harvest in a plant, yield per plant; and different fruit quality parameters such as TSS, p^H and Vitamin-C were recorded. All collected data were analyzed statistically using the MSTAT-C software and mean data were presented in the following sections.

RESULTS AND DISCUSSION

Effects of irrigation on strawberry cultivation

The effects of irrigation schedules sequences had non-significant (NS) effects on the yield and fruit quality of strawberry during 2012-2013 (Table 1). The highest yield per plant of 473.86 g was found from an alternate day irrigation application and followed by 378.81 g when irrigation applied in two days interval. The difference in yield between those of irrigation application is about 95.05 g and this is about 20.05% higher yield in treatments T_1, T_2 and T_3 than that of treatments T_2, T_4 and T_6. The other parameters have treads almost similar to that of the yield in relation to irrigation application. Therefore, considering yield performance, alternate day irrigation is suitable for strawberry cultivation than that of the two days interval. Comparing fruit quality parameters, no significant difference was seen among the TSS, p^H and Vitamin-C values for different irrigation applications. Comparatively higher amount of TSS (8.21) and Vitamin-C (60.61 mg/100 g) were recorded in alternate day's irrigation than that of two days interval.

Table 1. Effect of irrigation on yield and fruit quality components of strawberry in Joydebpur during 2012-2013

Treatments	Yield components							Quality Components		
	Crop season (days)	Length /fruit (mm)	Dia./ fruit (mm)	Wt./ fruit (g)	No. fruit/ plant	Harvested fruits/ plant	Yield/ plant (g)	TSS	p^H	Vitamin-C (mg/100 g)
T_1, T_3 & T_5 (I_1=alternate day)	94	36.10	28.84	14.33	37.83	32.61	473.86	8.21	4.17	60.61
T_2, T_4 & T_4 (I_2=two days interval)	93	34.75	29.10	13.57	31.50	26.44	378.81	8.03	4.21	60.50
CV%	2.05	4.49	6.16	9.07	13.93	14.91	16.50	5.20	2.42	4.92
LSD	NS									

Effects of fertilizers on strawberry cultivation

The effect of fertilizers on yield and quality contributing parameters of strawberry for 2012-2013 in Joydebpur are presented in Table 2. The highest yield per plant (492.53 g) of strawberry was obtained from lowest dose of fertilizers of N and K ($N_{70}K_{70}P_{40}S_{25}$). The second highest yield per plant of 418.76 g was found from the middle fertilizers dose of N and K ($N_{90}K_{90}P_{40}S_{25}$). However, the highest fertilizer dose produced the lowest yield per plant of 367.73 g. This indicates that the lowest fertilizer doses perform better over medium and higher doses. This might be due to normal rainfalls that prevent loss of fertilizers from crop root zone thus making more fertilizers available to the plants (Islam *et al*. 2009). On the other hand, no significant differences were seen among the TSS, p^H and Vitamin-C values. The TSS and p^H are observed high and Vitamin-C is low in application of the lowest doses of fertilizer as compared to the medium and higher doses.

Table 2. Effect of fertilizer dose on yield and fruit quality components of strawberry in Joydebpur during 2012 2013

Treatments	Yield components							Quality Components		
	Crop season (days)	Length/ fruit (mm)	Dia./ fruit (mm)	Wt./ fruit (g)	No. fruit/ plant	Harvested fruits/ plant	Yield/ plant (g)	TSS	p^H	Vitamin-C (mg/100 g)
T_1 & T_2 (F_1=$N_{110}K_{110}P_{40}S_{25}$)	93	34.04b	28.64	13.59	30.58	30.58b	367.73b	8.08	4.15	60.92
T_3 & T_4 ($F_{2=}N_{90}K_{90}P_{40}S_{25}$)	93	35.72a	29.31	13.37	36.58	36.58a	418.76ab	8.05	4.15	59.92
T_5 & T_6 ($F_{3=}N_{70}K_{70}P_{40}S_{25}$)	93	36.52a	28.95	14.87	36.83	36.83a	492.53a	8.24	4.26	60.83
CV%	2.05	4.49	6.16	9.07	13.93	14.91	16.50	5.20	2.42	4.92
LSD	NS	1.38	NS	NS	3.95	4.12	93.00	NS		

Effects of varieties on strawberry cultivation

In Table 3, it shows that the effect of varieties on yield and fruit quality components of strawberry in the year of 2012-2013 in Joydebpur. In FA-016 variety, the highest yield per plant (591.71 g) was obtained which is 55.90 % higher than that of the yield of BARI Stb.-1. The others yield contributing parameters seen similar differences to that of the yield as compared between two strawberry varieties. The higher TSS (9.02) was found in BARI Stb.-1, whereas the p^H (4.25) and Vitamin-C (65.83 mg/100 g) were obtained more in the variety of FA-016. Considering with the yield, it can be concluded that the FA-016 variety is more beneficial than that of the BARI Stb.-1.

Table 3. Effect of varieties on yield and fruit quality components of strawberry in Joydebpur during 2012-2013

Treatments	Yield components							Quality Components		
	Crop season (days)	Length /fruit (mm)	Dia./ fruit (mm)	Wt./ fruit (g)	No. fruit/ plant	Harvested fruits/ plant	Yield/ plant (g)	TSS	p^H	Vitamin-C (mg/100 g)
V_1 (BARI Stb.-1)	87	30.20	24.96	9.51	32.28	27.11	260.96	9.02	4.12	55.28
V_2 (FA-016)	98	40.66	32.98	18.38	37.06	31.94	591.71	7.23	4.25	65.83
CV%	2.05	4.49	6.16	9.07	13.93	14.91	16.50	5.20	2.42	4.92
LSD	NS									

Combined effects of irrigation, fertilizers and varieties on strawberry cultivation

The interactive effects of irrigation and fertilizer on the yield and fruit quality of strawberry are shown in Table 4. The highest yield per plant of 534.23 g was obtained from the interaction between alternate day irrigation and low fertilizer doses. The next below yield was 489.66 g from the interactions of alternate day irrigation and medium fertilizers. The lowest yield per plant of 337.75 g was obtained from the interactions of two days interval irrigation and high fertilizer doses. The differences could be greater if the rainfall was limited to normal year rainfall level. The other parameters varied almost in the similar fashion as those of individual effects of irrigation water and fertilizer doses. The quality parameters of strawberry regarding interaction of irrigation application and fertilizers are shown minor variations among the TSS, p^H and Vitamin-C.

Table 4. Combined effects of irrigation and fertilizers on yield and fruit quality components of strawberry in Joydebpur during 2012-2013

Treatments	Yield components							Quality Components		
	Crop season (days)	Length /fruit (mm)	Dia./ fruit (mm)	Wt./ fruit (g)	No. fruit/ plant	Harvested fruits/ plant	Yield/ plant (g)	TSS	p^H	Vitamin-C (mg/100 g)
$F_1 I_1$	93	34.32	28.56	13.68	32.50b	27.50b	397.70	8.02	4.16	61.50
$F_1 I_2$	92	33.76	28.73	13.51	28.67c	23.50c	337.75	8.13	4.15	60.33
$F_2 I_1$	92	36.81	29.95	14.01	41.83a	36.33a	489.66	8.10	4.15	60.00
$F_2 I_2$	93	34.63	28.66	12.74	31.33bc	26.33bc	347.86	8.00	4.15	59.83
$F_3 I_1$	93	37.18	28.01	15.29	39.17a	34.00a	534.23	8.52	4.20	60.33
$F_3 I_2$	93	35.87	29.89	14.45	34.50b	29.50b	450.83	7.97	4.32	61.33
CV%	2.05	4.49	6.16	9.07	13.93	14.91	16.50	5.20	2.42	4.92
LSD	NS	NS	NS	NS	3.55	3.41	NS	NS	NS	NS

Table 5 represents the combined effects of irrigation and varieties on the yield and quality contributing parameters of strawberry. The highest fruit yield per plant of 629.86 g was found from the interaction between alternate day irrigation and FA-016 variety. The second highest yield was 553.57 g from the interactions of two days interval irrigation and FA-016 variety. The lowest yield per plant of 204.05 g was obtained from the interactions of two days interval irrigation and BARI Stb.-1. It could be concluded that the alternate day irrigation and FA-016 variety were suitable for strawberry cultivation in Joydebpur. The other parameters varied remain same as those of individual effects of irrigation water application and variety. The TSS, p^H and Vitamin-C at the combined effects of irrigation and variety are varied as similar to that of yield parameters.

Table 5. Combined effects of irrigation and varieties on the yield and fruit quality components of strawberry in Joydebpur during 2012-2013

Treatments	Yield components							Quality Components		
	Crop season (days)	Length/ fruit (mm)	Dia./ fruit (mm)	Wt./ fruit (g)	No. fruit/ plant	Harvested fruits/ plant	Yield/ plant (g)	TSS	p^H	Vitamin-C (mg/100 g)
I_1V_1	87	30.10	24.92	9.87	37.11	31.89	317.87	9.21	4.09	55.67
I_1V_2	99	41.21	32.75	18.78	38.56	33.33	629.86	7.21	4.24	65.56
I_2V_1	87	29.40	24.99	9.15	27.44	22.33	204.05	8.82	4.16	54.89
I_2V_2	98	40.11	33.20	17.99	35.56	30.56	553.57	7.24	4.26	66.11
CV%	2.05	4.49	6.16	9.07	13.93	14.91	16.50	5.20	2.42	4.92
LSD	NS									

The interactive effects of fertilizers and varieties on the yield and quality of strawberry are shown in Table 6. Regarding yield per plant, the highest yield (716.54 g) was found from the interaction between the low fertilizer doses and FA-016 variety. The second highest yield was 541.33 g from the interactions of high fertilizer doses and FA-016 variety. The lowest yield per plant of 194.12 g was obtained from the interactions of high fertilizer doses and BARI Stb.-1 variety. It could be noted that the highest yield was found in the combination of low fertilizer doses with FA-016 variety and followed by middle and high fertilizer doses with same variety, respectively. The TSS, p^H and Vitamin-C at the combined effects of fertilizers and variety are varied almost similar to that of the yield parameters.

Table 6. Combined effects of fertilizers and varieties on the yield and fruit quality components of strawberry in Joydebpur during 2012-2013

Treatments	Yield components							Quality Components		
	Crop season (days)	Length/ fruit (mm)	Dia./ fruit (mm)	Wt./ fruit (g)	No. fruit/ plant	Harvested fruits /plant	Yield/ plant (g)	TSS	p^H	Vitamin-C (mg/100 g)
F_1V_1	87	29.55	25.37b	9.16c	26.33c	21.17c	194.12c	8.92	4.08	55.50
F_1V_2	98	38.53	31.91a	18.03b	34.83ab	29.83ab	541.33b	7.23	4.23	66.33
F_2V_1	88	30.71	26.19b	9.80c	37.50ab	32.17ab	320.24c	8.97	4.08	54.83
F_2V_2	98	40.73	32.43a	16.95b	35.67ab	30.50ab	517.28b	7.13	4.22	65.00
F_3V_1	86	30.33	23.31b	9.57c	33.00b	28.00b	268.52c	9.17	4.22	55.50
F_3V_2	100	42.71	34.59a	20.17a	40.67a	35.50a	716.54a	7.32	4.30	66.17
CV%	2.05	4.49	6.16	9.07	13.93	14.91	16.50	5.20	2.42	4.92
LSD	NS	NS	3.17	1.59	6.07	5.54	124.1	NS	NS	NS

The cumulative effects of irrigation, fertilizer doses and varieties on the yield and quality of strawberries are seen in Table 7. None of the cumulative yield contributing parameters in this experiment showed any significant difference but some of the interactive parameters might have produced the significant effects on the yield. The highest yield (761.60 g) was found from the interaction among an alternate day irrigation, low fertilizer doses and FA-016 variety. The second highest yield was 671.48 g from the interactions of low fertilizer doses, two days interval irrigation and FA-016 variety. On the other hand, using BARI Stb.-1 the highest yield was 434.94 g per plant with alternate day irrigation and middle fertilizer doses. The lowest yield per plant of 176.44 g was obtained from the interactions of high fertilizer doses, two days interval irrigation and BARI Stb.-1. From the above discussion, it is noticed that the cumulative effects of low fertilizer dose, sufficient irrigation (no deficit) and FA-016 variety of strawberry produced the highest yield and it might be suitable for strawberry cultivation under normal rainfall year in Joydebpur. The other parameters varied almost in the similar fashion as those of individual effects of irrigation application, fertilizer doses and varieties but required longer cropping season (100 days) for growing strawberry using alternate day irrigation, low fertilizer doses and FA-016 variety although it gives the highest yield. The TSS, p^H and Vitamin-C at the cumulative effects of irrigation application, fertilizer doses and variety are varied similar with the yield parameters. In all interactions, BARI Stb.-1 obtained high TSS but produced low p^H and Vitamin-C as compared to the FA-016 variety.

Table 7. Combined effects among the irrigation, fertilizers and variety on yield and fruit quality components of strawberry in Joydebpur during 2012-2013

Treatments	Yield components							Quality Components		
	Crop season (days)	Length/ fruit (mm)	Dia./ fruit (mm)	Wt./ fruit (g)	No. fruit/ plant	Harvested fruits/ plant	Yield/ plant (g)	TSS	p^H	Vitamin-C (mg/100 g)
$F_1I_1V_1$	89	30.13	25.63	9.33	27.67	22.67	211.81	8.93	4.08	57.00
$F_1I_1V_2$	98	38.51	31.49	18.03	37.33	32.33	583.60	7.10	4.23	66.00
$F_1I_2V_1$	86	28.96	25.12	8.98	25.00	19.67	176.44	8.90	4.07	54.00
$F_1I_2V_2$	98	38.56	32.33	18.03	32.33	27.33	499.06	7.37	4.24	66.67
$F_2I_1V_1$	87	32.33	26.53	10.58	47.00	41.33	434.94	9.07	4.09	54.67
$F_2I_1V_2$	98	41.28	33.37	17.44	36.67	31.33	544.37	7.13	4.21	65.33
$F_2I_2V_1$	88	29.08	25.84	9.01	28.00	23.00	205.53	8.87	4.06	55.00
$F_2I_2V_2$	98	40.19	31.40	16.47	34.67	29.67	490.18	7.13	4.23	64.67
$F_3I_1V_1$	85	30.52	22.63	9.70	36.67	31.67	306.87	9.63	4.11	55.33
$F_3I_1V_2$	100	43.83	33.00	20.87	41.67	36.33	761.60	7.40	4.29	65.33
$F_3I_2V_1$	87	30.15	24.00	9.44	29.33	24.33	230.17	8.70	4.33	55.67
$F_3I_2V_2$	99	41.59	35.79	19.46	39.67	34.67	671.48	7.23	4.31	67.00
CV%	2.05	4.49	6.16	9.07	13.93	14.91	16.50	5.20	2.42	4.92
LSD	NS									

Seasonal water use

Seasonal water included irrigation, effective rainfall and soil water contribution. As per design of irrigation treatments, drip irrigation at an alternate day and medium fertilizer dose (T_3) used the maximum seasonal water (606.60 mm) but the seasonal water requirement of strawberry was noticed maximum (474.0 mm) in drip irrigated control plot (Agarwal and Singh, 1973) and drip irrigation at two days interval and low fertilizer dose (T_6) consumed the least (422.3 mm) as shown in Table 8.

Table 8. Seasonal water uses (mm) under different treatments during the crop season, 2012-2013

Treatments	Irrigation (no.)	Dripper discharge (Liters/hr.)	Irrigation water applied (mm)	Effective rainfall (mm)	Soil water contribution (mm)	Seasonal water used (mm)
T_1	66	4.3	548	47.0	11.0	606.0
T_2	44	4.3	365	47.0	10.6	422.6
T_3	66	4.3	548	47.0	11.6	606.6
T_4	44	4.3	365	47.0	10.5	422.5
T_5	66	4.3	548	47.0	11.2	606.2
T_6	44	4.3	365	47.0	10.3	422.3

Economic-analysis

Table 9 (a-c) shows the economic analysis which reveals that the net return (Tk./ha) from the FA-016 variety cultivation with alternate day irrigation and low fertilizer doses ($N_{70}K_{70}P_{40}S_{25}$) was Tk. 4142115.00. The highest BCR (9.79) was also the highest in the variety of FA-016. The farmer can earn about Tk. 1121971.00 per/ha a net return by cultivating BARI Stb.-1 with the application of same irrigation water and fertilizer doses.

Table 9. Economic analysis of fertigation for strawberry cultivation (for 208 m^2) during the crop season 2012-2013

a. Fixed Cost

Drip irrigation cost (For 208 m^2)

Sl. No.	Item	Unit	Rate (Tk.)	Total (Tk.)	Life (yr.)	Cost/yr (Tk.)
1.	Fertigation tank	3	100.00	3000.00	5	600.00
2.	½" dia PVC pipe	130 m	20.00	2600.00	3	867.00
3.	2.5 mm dia micro tube	100 m	6.00	600.00	3	200.00
4.	Dripper & Connector	360	2.00	720.00	3	240.00
5.	GI fittings & support of platform	3		1500.00	3	500.00
					Total (Tk.) =	2407.00

b. Variable cost (For 208 m^2)

Sl. No.	Item	Total cost (Tk.)
1.	Seedling@5	1800.00
2.	Land preparation	500.00
3.	Fertilizer	1200.00
4.	Pesticides	400.00
5.	Labor	3000.00
6.	Netting	500.00
	Total (Tk.) =	7400.00

Total cost/year (for 208 m^2 of land) = Tk. (2407.00+7400.00) = 9807.00 utilized with both strawberry variety (BARI Stb.-1 and FA-016).

Therefore, total cost for individual variety (for 104 m^2 of land) = Tk. 4903.50

c. Return

Sl. No.	Item	Strawberry Varieties	
		BARI Stb.-1	FA-016
1.	Yield/104 m^2 (kg)	55.24	137.09
2.	Price (Tk./kg)	300	350
3.	Gross return (Tk.)/104 m^2	16572.00	47981.50
4.	Total cost/year/104 m^2	4903.50	4903.50
5.	Net return (Tk.)/104 m^2	11668.50	43078.00
6.	Net return (Tk./ha)	1121971.00	4142115.00
7.	Benefit cost ratio (BCR)	3.38	9.79

Based upon the performance of an alternate day irrigation and low fertilizer dose

CONCLUSION

During the crop season, early flowering, fruiting and harvesting was found using higher fertilizer doses and late in the low doses of fertilizer. But, the highest yield was found per plant with alternate day irrigation, low fertilizer dose for FA-016 strawberry. This studies shown that the strawberry can be grown well under drip irrigation system in terms of quality yield. For more confirmation, this study would be continued for further investigation although a very good result as well as best return (BCR) was obtained.

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