A COMPARATIVE ECONOMIC ANALYSIS AT DIFFERENT PLANTING TIMES WITH IRRIGATION AND MULCHING OF CABBAGE PRODUCTION

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ABSTRACT

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An experiment was conducted at the Horticulture Farm of Bangladesh Agricultural University, Mymensingh during the period from November 1998 to March 1999 to find out the effect of date of planting, irrigation and mulching on the economic performance of cabbage production. The experiment consisted of three planting time viz., 5 November, 20 November and 5 December and five levels of irrigation mulching viz. no irrigation and no mulch, one irrigation, three irrigation, irrigation followed by the straw mulch and irrigation followed by water hyacinth mulch. Economic analysis showed that early planting with irrigation and water hyacinth mulching treatment was economically profitable overall other treatment combination of the experiment in respect of net returned (Tk. 138383.70 /ha) and BCR (3.15).

Key words: Economic analysis, planting times, irrigation, mulches, yield

INTRODUCTION

Cabbage (*Brassica Oleracea var*. capita L.) is the most important herbaceous biennial cole crop under cruciferae family, which is one of the most important vegetables in the world. In Bangladesh it is planted in early September to late November (Ahmad and Shahjahan, 1991). It has been distributed in both the sub-tropical and tropical areas. In Bangladesh, cultivation of cabbage is mainly limited in winter month. Cabbage occupies 9900 hectares of land and the total production is about 90700 metric tons with an average yield of 10 tons per hectares in Bangladesh (BBS, 1996). This is considered a low yield compared to that of other countries such as 19.10 tons per hectare in India (FAO, 1997).

The minimum dietary requirement of vegetables per day per head is 235 g. where only 50% of it is available for the people of Bangladesh. Thus it is evident that a great shortage exists in vegetable production. A quick growing vegetable like cabbage can play an important role in this regard. Cabbage is a good source of nutrients having high vitamin-A content (12ug/100 g). The proper time of planting ensures plant growth properly through the efficient utilization of moisture, nutrient temperature, light etc. and consequently increased production may be expected. In the past, researches had been conducted on cabbage production in different planting times, but no research has so far been done combining with irrigation and mulching with planting time in Bangladesh condition. Since, cabbage is grown in the winter season in Bangladesh and rainfall becomes scantly or rare during that period, irrigation is provided to raise the crop successfully. But irrigation expenses especially frequent irrigation, increase the cost of production and make cabbage cultivation less profitable. Further more, market price of cabbage falls drastically in the peak harvesting period frustrating the growers. Even where irrigation is available, mulching may be used as substitute to minimize the cost of production. This experiment, therefore, is devoted to study the economic feasibility of cabbage production by using mulches as an alternative irrigation.

MATERIALS AND METHODS

The experiment was carried out the Horticulture Farm, Bangladesh Agricultural University, Mymensingh during the period from November 1998 to March 1999. The soil of the experiment plot was silty loam having pH6.8. Atlas-70 variety of cabbage was used in the experiment. The experiment was laid out in factorial Randomized Complete Block Design (RCBD) with three replications, Different mulches and irrigation treatments were assigned randomly to the unit plots each 2.4 x 2.25 m in size at three different dates, three planting times (P_1=5 November, P_2= 20 November, P_3= 5 December) and 5 irrigation and mulching (1_o= Control = No irrigation and No mulch, 1_1 = One irrigation, 1_2 = Three irrigations, 1_3 = Irrigation followed by Straw mulch, 1_4 = Irrigation followed by water hyacinth mulch) make 1_5 treatment combinations which were planted in triplicate on 45 unit plots. The initial thickness of mulches maintained for straw and water hyacinth was 8-10 cm. Twenty gram seeds were sown on three seed beds of 5x1m size each on 5 and 20 October and 5 November 1998 to get 30 day old seedlings at the time of transplanting at a spacing of 60x45cm. Cowdung, urea, triple super phosphate (TSP) and muriate of phosphate (MP) were applied at the rate of 15 ton. 250, 125 and 200 kg/ha, respectively (BARC, 1997). Urea and MP were applied at 15 and 30 DAT (days after transplanting) but others fertilizers were applied during final land preparation. Malathion 57 EC at the rate of 2 ml/L water was sprayed once to control aphid.

The crop was harvested on 6 and 20 February and March 1999, respectively when the plants formed compact heads. Data were recorded from ten plants randomly selected from a unit plot at the stage of head maturity in January, February and March 1999 for 1st and 2nd and 3rd plantings. At harvest the collected data on yield and economic analysis were done. The interests were calculated @ 13% for 6 months. Cost and return analysis was done in details according to the procedure of Alam *et al.* (1989).

RESULTS AND DISCUSSION

Existing level of production technologies were available in cabbage cultivation in terms of agronomic management and resource utilization pattern by different date of planting are presented in Table 1. The farmers irrespective of different date of planting, irrigation & mulching practiced same number of ploughings (5 times) in land preparation for cabbage cultivation. Sowing of cabbage seed was done during on 5 October, 20 October and 5 November 1998. Small farmers planted cabbage seedling a few days earlier than other groups where as large farmers planted later. The average seed rate was 620 gm per hectare and differences in seed rate varies among different date of planting. Farmers used chemicals fertilizer in cabbage production and the average rate was 15 ton cowdung, 250 kg urea, 125 kg TSP and 200 kg MP per hectare (BARC, 1997). It was observed that fertilizer application have been increased with the large farmers. None of farmers were found to apply insecticides in cabbage production. No of weeding, seedling transplanting and gap filling were done. From the result it was observed that harvesting of cabbage was started in the 6 February, 20 February and 6 March, 1999. The highest production of cabbage 81.04 ton, 2nd production 72.09 ton and the lowest production was 38.69 ton per hectare as recorded in the study. The yield variation was mainly due to input used and management factors. The details economic analysis has been presented in Table 1. The total cost of production ranges between Tk. 55338.04 to Tk. 64384.04/ha. Among the treatment combinations, the variation was due to the cost of different level of irrigation and mulch (Table-2). The highest cost of production (Tk. 64384.04) was involved in the treatment combination of irrigation followed by water hyacinth mulch irrespective of planting time. The gross return from different treatment combinations ranged between Tk. 58,035 and Tk.202600/ha. Gross return was the total income through sale of cabbage (marketable yield @ Tk. 2500, 2000 and 1500/t for first, 2nd and 3rd planting, respectively. The 5 November planted crops with irrigation and water hyacinth mulch gave the highest net return of Tk. 138383.70/ha followed by 5 November planting with irrigation + straw mulch of Tk. 115840.96/ha. But the lowest net return i.e. negative net return (Tk. 2596.96) was obtained from the treatment combination of 5 December planting with no irrigation and no mulch treatment. The benefit cost ratio was the highest (3.15) in treatment combination of 5 November planting with irrigation + water hyacinth mulch. On the other hand, the lowest benefit cost ration (1.04) was obtained from the treatment combination of late planting with no irrigation and no mulch. From the economic point of view, it was apparent from the above result that, treatment combinations of early planting with irrigation + water hyacinth mulch were more profitable than the rest of the treatment combination.

Conclusion

It may be conducted that the marketable yield of cabbage per hectare was remarkable increased by early planting with irrigation followed by mulch. Economic analysis showed that early planting in combination with irrigation + water hyacinth mulch treatment was economically profitable over all other treatment combinations of the experiment. It is evident from the present study that early planting (5 November) gave higher growth and yield and that successful cabbage production is possible by using one irrigation followed by water hyacinth mulch as an alternative to irrigation..

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Table-1. Crop management input us and production cost of cabbage per hectare

Input cost (Tk.)

Treatment combinations	Labour cost	Ploughing	Seed	Bamboo & Chatai	Irrigation	Mulch	Insecticides
P_1I_o	15000	5000	1240	500	-	-	2000
P_1I_1	16000	5000	1240	500	1000	-	2000
P_1I_2	18000	5000	1240	500	3000	-	2000
P_1I_3	20000	5000	1240	500	1000	2000	2000
P_1I_4	20000	5000	1240	500	1000	1850	2000
P_2I_o	15000	5000	1240	500	-	-	2000
P_2I_1	16000	5000	1240	500	1000	-	2000
P_2I_2	18000	5000	1240	500	3000	-	2000
P_2I_3	20000	5000	1240	500	1000	2000	2000
P_2I_4	20000	5000	1240	500	1000	1850	2000
P_3I_o	15000	5000	1240	500	-	-	2000
P_3I_1	16000	5000	1240	500	1000	-	2000
P_3I_2	18000	5000	1240	500	3000	-	2000
P_3I_3	20000	5000	1240	500	1000	2000	2000
P_3I_4	20000	5000	1240	500	1000	1850	2000

Input cost (Tk.) Continued

Treatment combinations	Manures and fertilizers cost				Sub-Total
	Cowdung	Urea	TSP	MP	
P_1I_o	6000	1750	2000	1800	35290
P_1I_1	6000	1750	2000	1800	37290
P_1I_2	6000	1750	2000	1800	41290
P_1I_3	6000	1750	2000	1800	43290
P_1I_4	6000	1750	2000	1800	43140
P_2I_o	6000	1750	2000	1800	35290
P_2I_1	6000	1750	2000	1800	37290
P_2I_2	6000	1750	2000	1800	41290
P_2I_3	6000	1750	2000	1800	43290
P_2I_4	6000	1750	2000	1800	43140
P_3I_o	6000	1750	2000	1800	35290
P_3I_1	6000	1750	2000	1800	37290
P_3I_2	6000	1750	2000	1800	41290
P_3I_3	6000	1750	2000	1800	43290
P_3I_4	6000	1750	2000	1800	43140

Overhead cost (Tk.) Continued

Treatment combinations	Cost of lease of land (for 6 months)	Miscellaneous cost (5% of input cost)	Interest on running capital (for 6 months 13% of cost/year)	Sub-total	Total cost of production (Input cost+ overhead cost)
P_1I_o	15000	1764.5	3383.54	20148.04	55438.04
P_1I_1	15000	1864.5	3520.04	20384.54	57674.54
P_1I_2	15000	2064.5	3793.04	20857.54	62147.54
P_1I_3	15000	2164.5	3929.54	21094.04	54384.04
P_1I_4	15000	2157.0	3919.30	21076.30	64216.30
P_2I_o	15000	1764.5	3383.54	20148.04	55438.04
P_2I_1	15000	1864.5	3520.04	20384.54	57674.54
P_2I_2	15000	2064.5	3793.04	20857.54	62147.54
P_2I_3	15000	2164.5	3929.54	21094.04	54384.04
P_2I_4	15000	2157.0	3919.30	21076.30	64216.30
P_3I_o	15000	1764.5	3383.54	20148.04	55438.04
P_3I_1	15000	1864.5	3520.04	20384.54	57674.54
P_3I_2	15000	2064.5	3793.04	20857.54	62147.54
P_3I_3	15000	2164.5	3929.54	21094.04	54384.04
P_3I_4	15000	2157.0	3919.30	21076.30	64216.30

Table 2. Cost and return of cabbage cultivation due to the date of planting and irrigation and mulching.

Treatment combinations	Marketable yield (t/ha)	Gross return (Tk/ha)	Total cost of production (Tk/ha)	Net return (Tk/ha)	Benefit Cost Ratio (BCR)
P_1I_o	58.64	146600	55438.04	91161.96	2.64
P_1I_1	60.00	150000	57674.54	92325.46	2.60
P_1I_2	68.88	172200	62147.54	110052.46	2.77
P_1I_3	72.09	180225	64216.04	115840.96	2.80
P_1I_4	81.04	202600	64216.30	138383.70	3.15
P_2I_o	50.15	100300	55438.04	44861.96	1.80
P_2I_1	60.67	121340	57674.54	63665.46	2.10
P_2I_2	63.04	126080	62147.54	63932.46	2.03
P_2I_3	65.01	130020	64384.04	6563.96	2.01
P_2I_4	71.93	143860	64216.30	79643.70	2.24
P_3I_o	38.69	58035	55438.04	2596.96	1.04
P_3I_1	46.40	69600	57674.54	11925.46	1.20
P_3I_2	48.69	73395	62147.54	11247.46	1.28
P_3I_3	52.16	78240	64384.04	13855.96	1.21
P_3I_4	57.96	86940	64216.30	22723.7	1.35

Planting time
P_1 = 5 November
P_2 = 20 November
P_3 = 5 December
Labour cost @ Tk. 50/day/labour
Ploughing 5 times @ Tk. 1000/plough/ha
Seed 620g/ha @ 2000/kg/ha

Irrigation and mulch
1_0 = No irrigation and no mulch
1_1 = One irrigation 12 = Three irrigations
1_3 = Irrigation followed by straw mulch
1_4 = Irrigation followed by water hyacinth mulch

Straw @ Tk. 2000/ha
Water hyacinth @ Tk. 1850/ha
Irrigation @ Tk. 1000/irrigation/ha