GROWTH AND YIELD OF CAULIFLOWERS AS INFLUENCED BY POLYETHYLENE MULCHING

M.M.R. SALIM[1], A.S.M.M.R KHAN[2], M.A. SARKAR[3], M.A. HOSSAIN[4] AND M.J. HOSSAIN[5]

[1]Scientific officer, Agricultural Research Station, BARI, Thakurgaon, [2] Senior Scientific officer, OFRD, BARI, [3] Scientific officer, Entomology Division, BARI, [4]Senior Scientific officer, RARS, Ishurdi, Pabna and [5] Scientific officer, OFRD, BARI, Sylhet

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ABSTRACT

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Response of cauliflower to polyethylene mulch was evaluated during September '03 to January '04 at Regional Agricultural Research Station (RARS), Ishurdi, Pabna to find out whether black polyethylene mulch is suitable or not for cauliflower production in Bangladesh. The treatments were polyethylene mulch (with or without) and the three varieties (Poushali, Snow crown and IPSA-1). There was a positive impact of mulch on yield and yield attributes of the crops. The highest marketable yield (31.32t/ha) was obtained from hybrid variety Snow crown with mulch was 35.16% higher than without mulch. Other two varieties also produced higher yield under mulched condition than the without mulch. The production cost was higher in mulched treatment by Tk. 1510. A net additional return of Tk. 97800, 41040 and 30840 from the varieties Snow crown, Poushali and IPSA-1 respectively, was obtained due to mulching.

Key words: Growth, yield, polythene, mulch, cauliflower

INTRODUCTION

Cauliflower (*brassica oleracea* var. *botrytis. sub* var. *cauliflora L.*) is one of the most important and popular vegetable crops in many countries of the world. It is grown in Bangladesh during winter season, generally extending from October to March, when there is scanty or no rainfall. Salter (1959) reported that at least 25% of the available soil moisture could be depleted before irrigation was required to maintain maximum growth rate. He further reported that once cauliflower plants become established they should be irrigated whenever the soil moisture reaches the deficit point.

It is often found that due to lack of enough irrigation water cauliflower crops end up in very low yield. It is said to efficient management of water through better conservation if the soil moisture may help to overcome the problem of poor yield and may save watering cost to a good extent. Covering the soil with mulch is a good means of conserving soil moisture through substantial reduction in evaporation (Roy and Singh, 1983; Djigma and Diemkouma, 1986; Mannan and Rashid, 1983). Polyethylene mulches resulted in higher fruit yield compared to straw mulch and control in water melon (Quadir, 1992). Hence it is evident that mulching is an important factor for the production of cauliflower.

Now a days polyethylene mulch is used more widely for conserving soil moisture and to decrease the cost of weeding in different countries, ultimately resulting in lower cost of cauliflower production and other winter vegetables. Therefore, the present study was undertaken to find out whether black polyethylene mulch is suitable or not for cauliflower production in Bangladesh.

MATERIALS AND METHODS

An experiment was conducted during the September'03 to Jamuary'04 at RARS, Ishurdi, Pabna. Three variety of cauliflower IPSA-1, Poushali and Snow crown were used in this study with mulch and no mulch. The experimental design was Randomized Complete Block Design with 3 replications. The plot size was 9m x 1.2m Fertilizer application was done @ cowdung 10000, Ash 500, N 120, P_20_5 80 and K_20 100 kg/ha. The entire quantity of cowdung, Urea (N), TSP (P_20_5), MP (K_20) and half of ash were applied as basal dose during land preparation. The remaining ash was applied in the pit. In the mulch designated plots, polyethylene mulch was placed on the day of planting. Transplanting holes on the polyethylene mulch were made with a blade at the transplanting spot for each seedling. Then transplanting pits were dug and ash was mixed with the soil of the pit. Healthy, uniform sized thirty days old seedlings were transplanted in the pit on 8 October, 2003 at the spacing of 60 x 60 cm. Each plot had two rows of 15 plants. Irrigation and weeding were done properly when needed. Curds were harvested at mature stage. Harvesting was started from December 23, 2003 and was completed by January 25, 2004. Data on plant height, no. of leaves/plant at 50 days after transplanting (DAT), biggest leaf size at 50 DAT, curd diameter, curd height, pure curd yield and marketable curd yield were recorded timely.

Economic analysis of this experiment was also done. The cost of production for land preparation, seed transplanting materials, mulch, weeding, fertilizer, irrigation and man hours (mh) required for all operations including harvesting were recorded plot wise. The market price of cauliflower was determined at harvest.

RESULTS AND DISCUSSION

The effect of mulching on yield attributing characters of three cauliflower varieties is presented in the Table 1. All the three varieties had consistently higher plant height under mulched condition. Olasantan (1985) also reported that mulched plants grow taller than unmulched plants. The tallest plant (57.40cm) were found with the variety Snow crown in mulched condition and the shortest (38.90cm) with IPSA-1 in no mulched condition. At 50 DAT mulched and no mulched plots produced similar number of leaves/plant. This finding supports the results of Sutater (1987). The size of the biggest leaf was not influenced by mulching. Mulching significantly influenced the curd diameter. The influence of variety on curd diameter was strongest with Snow crown producing the biggest diameter (18.10cm) and IPSA-1 the smallest (12.31cm). In all the cases curd diameter was higher in mulched plots. In respect of pure curd yield the varieties showed wide variation among them. Snow crown produced the highest curd yield (17.71 t/ha) which was followed by poushali ((15.45 t/ha) and IPSA-1 produced a low curd yield because of late transplanting than its optimum transplanting time. Taking into account the interaction between mulching and variety it was found that mulched Snow crown plots came out to be the most superior varieties produced significantly higher pure curd yield in mulched plots than when it was unmulched. The lowest yield (7.07 t/ha) was obtained from unmulched IPSA-1. Better and efficient resource below the ground could be a reason why the mulched plots irrespective of variety, produced higher curd yield (Manrique and Meyer, 1984). The higher pure curd yield per unit area was accounted for by the higher weight of pure curd which is attributable to the better soil environment created by mulching. All three varieties were significantly different from one another in respect of marketable yield. The variety Snow crown with mulch produced 31.32 t/ha, which was significantly different from the other treatments. The second highest marketable yield (23.17 t/ha) was also obtained from the same variety without mulch. The lowest marketable yield (12.23 t/ha) was obtained from the treatment combination of IPSA-1 with no mulch. This is in agreement with Suwwan et al., (1988), who found that plastic mulch increased marketable yield and total number of fruits in tomato. Similar results were also reported by Gunadi and Suwandi (1988). The increased yield due to mulching might be occurred from better moisture utilization and lesser competition from weeds. Furthermore, the soil crust formed on unmulched plots might be another reason of low yield of them. Because such soil crust may have reduced aeration in the soil hampering root respiration.

Table 1. Effect of variety and mulch on yield and yield contributing characters of cauliflower

Treatment		Plant height (cm)	No. of leaves/ plant at 50 DAT	Biggest leaf size cm^2 at 50 DAT	Curd diameter (cm)	Curd height (cm)	Pure curd yield (t/ha)	Marketable curd yield (t/ha)
Variety	Mulch							
Poushali	M_1	52.95 bc	18.89 bc	971.78 b	16.98 b	9.02 a	15.45 b	22.13 b
	M_0	51.08 c	17.14 c	1080.56 b	16.22 b	8.24 b	11.94 c	18.71 c
Snow Crown	M_1	57.40 a	16.22 c	1265.67 a	18.10 a	8.51 b	17.71 a	31.32 a
	M_0	55.20 ab	16.44 c	1152.94 ab	18.09 a	8.47 b	16.03 b	23.17 b
IPSA-1	M_1	40.21 d	21.78 ab	865.94 c	14.27 c	5.90 c	9.47 d	14.80 d
	M_0	38.09 d	24.00 a	679.67 c	12.31 d	4.95 d	7.07 e	12.23 e

M_1 = Mulch M_o = Without Maulch.

Economic analysis of mulch use in different varieties of cauliflower is given in Table 2 and 3. The highest material cost of Tk. 20995/ha was for the treatment mulch in Snow crown. The seedling cost varied due to the variation of seeds number per gram, different seed price among the varieties and required labors for intercultural operations. The total variable cost Tk. 24634/ha was for the treatment Snow crown without mulch. But a net return to Tk. 351206/ha was obtained by using mulch which was higher than the without mulch of same variety. The benefit cost ratio also was higher in mulched plots with all three varieties. The highest return was highest Tk. 97800/ha or mulch in Snow crown followed by Poushali and IPSA-1 respectively. Only additional investment (Tk. 1510/ha) was in mulched treatment.

The results of the experiment suggested that we can carn much higher net return by using mulch than the traditional method of growing cauliflower without any mulch and through cultivation of the variety Snow crown is more profitable than the variety Poushali and IPSA-1.

Table 2: Inputs requirements for the cauliflower plots with or without mulch

Treatment		Seedling cost (Tk/ha)	Mulch Cost (Tk/ha)	Fertilizer Cost (Tk/ha)	Irrigation Pump charge (Tk/ha)	Fuel cost & charge for tiller (Tk/ha)	Total (Tk/ha)
Poushali	M_1	280	-	10694	1280	5000	17254
	M_0	280	2630	10694	1280	5000	19884
Snow crown	M_1	1390	-	10694	1280	5000	18364
	M_0	1390	2630	10694	1280	5000	20994
IPSA-1	M_1	250	-	10694	1280	5000	17224
	M_0	250	2630	10694	1280	5000	19854

Rate used: Cauliflower, Tk. 12/kg; Urea Tk. 4.20/kg; TSP Tk. 10/kg; MP Tk. 8/kg; Ash Tk. 150/ton; Cowdung Tk. 650/ton; Mulch tk. 35/kg.

Table 3: Summery of the cost and return analysis of cauliflower varieties

Treatment		Total labour cost (Tk/ha)	Total material cost (Tk/ha)	Total variable cost (Tk/ha)	Gross return (Tk/ha)	Net return (Tk/ha)	Benefit cost ratio (Tk/ha)	Additional cost (Tk/ha)	Additional return (Tk/ha)
Poushali	M_1	4760	17254	22014	224520	202506	10.20	-	-
	M_0	3640	19884	23524	265560	242036	11.29	1510	41040
Snow crown	M_1	4760	18364	23124	278043	254916	12.02	-	-
	M_0	3640	20994	24634	235840	351206	15.26	1510	97800
IPSA-1	M_1	4760	17224	21984	146760	124776	6.68	-	-
	M_0	3640	19854	23494	177600	154106	7.56	1510	30840

REFERENCES

Djigma, A. and D. Diemkouma. 1986. Plastic mulch in dry tropical zones. Trials on Vegetable Crops in Burkina Faso. Plasticulture. 69 (1):19-24

Gunadi, N. and Suwandi. 1988. Effects of mulching and plant spacing on growth and yield of tomato var. Berlian. Bulletin Penelitian Hortikultura 16 (2): 61 -66

Mannan, M.A. and M.M. Rashid. 1983. Effect of spacing and mulching on the yield and profitability of panchamukhi kachu (*Colocasia esculenta*). Bangladesh J. of Agril. Res., 8(2): 70-73

Manrique, L.A. and r. Meyer. 1984. Effects of soil mulches on soil temperature, plant growth and potato yields in an arideie. Isothermic Environment in Peru. 34 (4): 413-419

Olasantan, F.A. 1985. Effects of intercropping, mulching and staking on growth and yield of tomatoes. Experimetnal Agriculture. 21 (2): 135-144

Quadir, M.A. (1992). Mulching effects on fruit yield of watermelon. Agric. Sci. Digest. 12 (1): 1-3

Roy, K. and R.K. Singh. 1983. Effects of mulches and nitrogen on moisture use pattern and moisture efficiency in rain fed wheat. Ind. J. Agril. Res. 17 (4): 203-208 (Cited from field crop abstract 1985. 35 (10)

Salter, P.J. 1959. Study on crop maturity in cauliflower. Relationship between the time of curd initiation and curd maturity of plants within a cauliflower crop. J. Hort. Sci., 44(2): 129

Sutater, T. 1987. Shading and mulching effect on potato yield. Bulletin Penelitian Hortikultura. 15(2): 191-198

Suwwan, M.A., M. Akkawi. A.M.Al-Musa, A. mansour. 1988. Tomato performance and incidence of tomato yellow leaf curl (TYLC) virus as affected by type of mulch. Scientia Horticulturae. 37(1-2: 39-45)