

ASSESSMENT OF PERFORMANCE OF EARLY CAULIFLOWER VARIETY “SABOUR AGRIM” VIS-A-VIS DIFFERENT DATES OF TRANSPLANTING IN KHARIF IN ARWAL DISTRICT OF BIHAR

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ABSTRACT

A field experiment was conducted for two consecutive years (2013 and 2014) with a view to assess the response of early Cauliflower variety (Sabour Agrim) to different dates of transplanting in Kharif. The trial was conducted in RBD with four treatments replicated ten times. The treatments involved were T₁ - Farmers practice (Cultivated main season cauliflower in Arwal District), T₂ - Transplanting on 1st July, T₃ - Transplanting on 15th July and T₄ - Transplanting on 30th July. The results revealed that the application of T₃ had a significant effect on growth and yield of Cauliflower. The result also revealed that the transplanting on 15th July (T₃) witnessed the maximum plant height (67.30 cm.), the best marketable size of curd (430.85 gm), maximum curd length (13.40), curd greatest diameter of curd (15.60 cm.) and the Maximum Curd yield 223.51 q/ha giving maximum net return (Rs 1,87,820 q/ha) with higher benefit cost ratio (3.31) whereas transplanting on 30th July ranked second in merit. Cauliflower can be grown better at places which are steady cool, frost and litter free than other Brassicaceae. It is difficult to grow Cauliflower as a spring crop because it tends to bolt in the condition of extreme heat. The height of the plants at different weeks after transplanting was observed to vary significantly among different planting times.

INTRODUCTION

Cauliflower (*Brassica oleracea var. botrytis*) belongs to family Brassicaceae and is popular for its white tender, head or curd. Cauliflower is one of the most important winter flower vegetables of India. Cauliflower head has numerous medicinal and nutritional properties having plenty of Vitamin 'B', minerals and Vitamin 'C'. Cauliflower is rich in Indole-3-Carbinol Sulforaphane which prevents over-weight, diabetes and affords protection from prostate and cervical Cancers. India produces 4.694 mt of Cauliflower per year from 256 M ha area with an average productivity of about 18.3 mt/ha. The major Cauliflower producing states are Bihar, Uttar Pradesh, Orissa, West Bengal, Assam, Haryana and Maharashtra. In the plains, it is available in the market from September to May. It is consumed as a vegetable in curries, soups and pickles. Cultivation of Cauliflower depends upon adaphic and biotic factors. Timing of curd initiation is a key determinant of yield and maturity which is totally influenced by date of transplanting (Din *et al.*, 2007). Vegetative growth parameters like plant height, number of leaves, whole plant weight, marketable curd weight and yield were influenced significantly by the date of planting Ara *et al.* (2009). Cauliflower thrives best in a cool moist climate. It does not withstand very low temperature or too much heat. Cauliflower heads will not develop well in hot weather and for this reason it is grown mostly summer season over. The optimum temperature that the Cauliflower withstands is 10 to 15°C. In regions where freezes do not occur, planting may be done at any time of the year if water is available for growing the crop. In India growing

of vegetable is 4.8 times more remunerative than cereals and other field crops. Vegetable cultivation generally provides more employment than cereal crops. India has to find ways to accelerate the vegetable production by developing high yielding varieties, resistant to pests and diseases, hybrids and production technologies. Still there is a need to increase its production in order to achieve target for supply of minimum 200 g and Optimum 300 g. vegetable per capita per day. It is the most sensitive of the Brassicaceae to frost. For fall crop, sowing seeds in mid-June to set out transplants in late July, allows 2 to 3 months growing time before first frost. Cauliflower can be grown wherever there are steady cool, frost-free growing seasons. Around 60 degrees Celsius is the preferred temperature. Cauliflower cultivation in Arwal district during summer is adversely affected by high temp. In this condition existing Cauliflower varieties need to be replaced by suitable high yielding variety which is tolerant to high temperature. Cauliflower is very much exacting in climatic requirements compared to other Cole crops (Ara *et al.*, 2009). Hence, planting at the appropriate time using the suitable variety is essential to ensure a healthy crop and to get good curd yield with high market value. Cauliflower is the prefloral fleshy apical meristem and the formation of curd is the transient stage between vegetative and generative stage which is highly influenced by the prevailing weather conditions. According to Gill and Sharma (1996), sowing times depend on the varieties and the agro climatic conditions prevailing in a particular region. In North-Indian plains, early Cauliflowers are sown from May end to mid-July, mid types from July to August end and snowball types from September to October.

Thus a field experiment assessment of performance of Early Cauliflower var. 'Sabour Agrim' vis-à-vis different dates of transplanting in Kharif in Arwal district of Bihar" was conducted at 10 farmer's field of KVK Arwal during Kharif 2013 and 2014.

MATERIALS AND METHODS

A field experiment was conducted during the month of June-2013 and 2014 at farmers field of Arwal district adopted by KrishiVigyan Kendra, Lodipur Farm, Arwal under Bihar Agricultural University, Sabour, Bhagalpur(Bihar) to evaluate the growth, yield and economical parameter vis-à-vis different dates of transplanting of Cauliflower var. "SabourAgrim". The experiment was laid out in Randomized block design involving four treatments replicated ten times. The treatment involved were T₁ -Farmers practice (do not cultivate Early Cauliflower in this period), T₂ -Transplanting on 1st July, T₃ -Transplanting on 15th July and T₄ -Transplanting on 30th July. The plot size was kept 20m x 4m per treatments. The seeds were collected from Department of Horticulture Bihar Agricultural University, Sabour, Bhagalpur (Bihar). Seeds were sown in the nursery beds at intervals of 15 days (1st June, 15th June, and 30st June). At preparation of nursery beds, well-rotten FYM was added. Before experiment, soils were analyzed in soil testing Laboratory to know the physio- chemical properties. Same operational and cultural practices were followed for all treatments. For early season crop, the seeds were treated with Copper oxychloride (2.5 g/lit) mercurial fungicide to save the young seedlings from damping off. Seeds were sown in the month of June for early season at the seed rate of 400 g/ha. The seeds were sown and covered with fine and well-rotten FYM. Beds were immediately misted with the help of sprinkler and all the beds were covered with wheat straw. After three days, germination of seeds started and completed after six days. Irrigation was given at intervals of three days with the help of sprinkler. When the seedlings attained the height of 3 cm, thinning was done to get healthy and strong seedlings. After thirty days, transplantation of the seedlings was carried out at intervals of 15 days (1st July, 15th July and 30th July) in the evening time. Plant to plant spacing was kept 45 cm and row to row spacing was 60 cm. Healthy seedlings of uniform size were selected for the transplantation. Nursery beds were irrigated before uprooting of seedlings so that the seedlings could be easily taken out from the beds without any damage to the roots. Full dose of P₂O₅ (90kg/ha) as single super phosphate (SSP) and K₂O (60kg /ha) as sulphate of potash (SOP) with half dose of N (60kg/ha) was applied at the time of soil preparation through broadcast method, while the remaining N was applied as urea 30 days after transplanting.

After transplantation, the experimental field was irrigated and the second irrigation was applied 3- days after transplantation. After this, irrigation was given at 4-6 days interval up to the harvest of crop. Cauliflower was ready to harvest in approximately 60-80 days after transplanting date. As soon as the compact head was formed and blanched, it was cut off with the help of a sharp knife, along with the leaves for its protection. Harvest was done when the curds were still smooth. For the determination of total fresh plant weight, five randomly selected plants in each treatment were weighed and then average total fresh plant weight was calculated. For the determination of marketable curd weight five plants were randomly selected and their curds were weighed to calculate the average curd weigh. For the determination of the curd diameter, five curds from each treatment were randomly selected and their circumferences were determined by measuring tape and the curds diameter were obtained with the help of the following formula. Diameter = circumference/ 3.14 plant height was recorded at the time of harvesting of curd. B:C ratio was computed by dividing the gross income by cost of cultivation and presented in table 4.

Transplanting on 5th July in both the years resulted in the maximum yield of good quality marketable curds proved to be the most suitable date of planting of the Cauliflower var. "Sabour Agrim" in the reason of Arwal district of Bihar. Farmers can gain a handsome profit by growing Sabour Agrim adopting the transplantation and agronomic practices followed in this trial.

RESULTS AND DISCUSSION

Plant Height

The data related to plant growth parameters are presented in table 3. The plant height of Cauliflower varied from 56.96 cm to 67.30 cm. A perusal of data revealed that plant height was maximum (67.30 cm) in case of transplanting on 15th July (T₃) and minimum (56.96 cm) in case of T₂. It was also found that T₃ showed highly significant effect on plant height. Maximum plant height in T₃ might be attributed to the prevailing conducive climatic conditions which is in conformity with the findings of Ara *et al.* (2009). Reduced plant height with respect to delay in planting time was observed in 2013-14. Positive response of transplanting date on the height of plant was also noted by Srivastava *et al.* (2002), BingLiang *et al.* (2005) and Ara *et al.* (2009).

Curd Length

The data related to plant growth parameter is presented in Table 3. The curd length of Cauliflower varied from 10.81cm

Table 1: Meteorological observations during trial period

Month	Tempreture-2013		Tempreture-2014		Humidity (%)		Rainfall(mm)	
	Min.	Max.	Min.	Max.	2013	2014	2013	2014
	Temp.(°C)	Temp.(°C)	Temp.(°C)	Temp.(°C)	(Max.)	(Max.)		
June	29.20	44.30	25.50	43.20	85.30	84.40	20.24	19.96
July	29.90	42.50	26.50	44.60	86.00	88.10	73.55	83.34
August	29.10	40.60	25.70	41.50	87.60	89.40	144.25	155.12
September	29.10	39.30	24.80	38.50	87.80	89.90	98.24	104.42
October	30.00	38.80	22.30	37.20	89.20	88.60	3.10	2.98

Table 2: Soil status of the experimental plots (Average of year 2013 and 2014)

Replication	pH	ECe(d Sm ⁻¹)	OC(%)	N	P (kg/ha)	K
1	5.72	0.17	0.59	272	421.2	116.48
2	5.97	0.16	0.61	291.0	22.9	176.5
3	5.81	0.19	0.67	300.0	22.85	64.96
4	5.80	0.26	0.32	211.0	13.71	72.8
5	5.97	0.24	0.12	159.0	27.42	99.6
6	5.90	0.31	0.74	318.0	13.71	96.3
7	5.73	0.21	0.68	301.0	9.14	94.0
8	5.88	0.29	0.58	251.0	13.71	90.7
9	5.76	0.31	0.53	239.0	22.85	87.3
10	6.03	0.25	0.50	226.0	31.99	181.4

Table 3: Vegetative and reproductive characters of early Cauliflower var. Sabour Agrim (Average of year 2013 and 2014)

Treatments	Marketable curd weight(gm)	Curd length (cm)	Plant height (cm)	Curd diameter (cm)	Yield of marketable curd(q/ha)
T ₁ -Farmers Practice	Farmer do not cultivate	Early Cauliflower in this period			
T ₂ -Transplanting on 1 st July	308.06	10.81	56.96	11.02	123.41
T ₃ - Transplanting on 15 th July	430.85	13.40	67.30	15.60	223.51
T ₄ - Transplanting on 30 th July	372.16	11.95	62.28	12.57	155.53
C.D.	18.37	1.33	3.22	1.15	9.02
CV	5.28	11.72	5.52	9.38	5.73
S E Diff.	8.74	0.63	1.53	0.55	4.29

to 13.40cm. It was found that curd length of Cauliflower was maximum (13.40 cm) with the transplanting on 15th July 2013 (T₃) and minimum (10.81 cm) with T₂. It was also found that T₃ showed highly significant effect on curd length than other treatments. The results related to curd length is in close conformity with the findings of Shrivastava *et al.*, 2002, Ajit Kumar and Savani, 2007 and Yanglem and Tumbare, 2014.

Curd Diameter

Analysis of data (Table-3) revealed that curd diameter varied from 11.02 cm. to 15.60 cm. Maximum curd diameter (15.60 cm) was observed in the treatment T₃ where as minimum (11.02cm.) in the treatment T₂. It was also found that curd diameter in T₃ was significantly superior to other treatments. Maximum curd diameter may be due to optimum time of transplanting providing suitable Temperature and climatic condition as reported by Jaiswal *et al.* (1996) and Santhosha *et al.* (2014) who reported that big and heaviest curd weight was found in early sown crop.

Marketable Curd Weight

Analysis of data (Table 3) showed that Marketable curd weight varied significantly. Maximum marketable curd weight (430.85 gm.) was observed in treatment T₃ whereas minimum (308.06 gm.) with in treatment T₂. It was also found that marketable curd weight in T₃ proved significantly superior to other treatments. Marketable curd was significantly affected by sowing dates which is in close conformity with the findings of Ashok, *et al.* (1995) who reported that early planting recorded large sized leaves and more days to curd maturity resulting in compact white curds of maximum weight in the early plantings. In the present study, curd weight decreased with delay in planting which is in agreement with the observations made by many workers (Crisp, 1984; Gautam *et al.*, 1998; Sphehia and

Korla, 2000; Pradeep Kumar *et al.*, 2002; Jana and Mukhopadhyay, 2006; Ajit Kumar and Savani, 2007).

Marketable Curd Yield

Analysis of data presented in Table 3 revealed that yield of marketable curd varied significantly from 123.41q/ha to 223.51q/ha. Maximum yield of the marketable curd (223.51 q/ha) was observed in treatment T₃ where as minimum (123.41 q/ha.) in treatment T₂. Analysis of data also showed that T₃ proved significantly superior to other treatments. Plants transplanted after 15th July faced a rapid fall in temperature which induced the curds formation, the curds before attaining the critical plant size which was also reported by Castillo *et al.* (1991) who claimed that delay in sowing resulted in the short growing period for winter cultivars and consequently poor yield of curds.

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