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Yield gap analysis of early cauliflower (*Brassica oleracea* var. *botrytis*) cv. Sabour Agrim through front line demonstrations

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Abstract

A study was conducted on cultivation of early season variety of cauliflower, i.e. Sabour agrim released by Bihar Agricultural University, Sabour. During study the krishi vigyan Kendra (KVK) mainly focus on comparative analysis between local cultivar and Sabour agrim. Having studied on various facts it was found that Sabour agrim has better yield potentiality in comparison with the local cultivar (check). The study was comprised of survey, PRA, front line demonstration of variety, field visit, analysis of data and focus group discussion. Since the KVK had demonstrated Sabour agrim a large number of farmers in Purnia district of Bihar. The edible curd were harvested to catch early market from 2nd and 3rd weeks of October month and sold in the local markets. The total cost of cultivation was Rs. 45,500.00/ha and net return was Rs. 285,754.00 /ha¹ with B: C ratio 6.28 in comparison with local cultivar. The yield was registered significantly highest i.e. 184.18 q/ ha with the Sabour Agrim over to local once (check) i.e. 154.06 q/ ha.

Keywords: Economics Sabour Agrim, cauliflower, growth, yield

Introduction

Cauliflower (*Brassica oleracea* var. *botrytis*) belongs to family Brassicaceae is a popular cool season vegetable grown for its white and tender curd. The curd contains a good amount of vitamin B and protein. It is also a rich source of minerals mainly phosphorus and sodium. India produces 4.69 mt. of cauliflowers per year from 256 m ha area with an average productivity of about 18.3 t/ha. The major cauliflower producing states are Bihar, Uttar Pradesh, Orisa, West Bengal, Assam, Haryana and Maharashtra. In the plains, it is available in the market from September to May. In Cauliflower 100 grams of raw white curd provides 25 calories, is low in fat, carbohydrates, dietary fiber and protein. It has a high content (20% or more of the Daily Value, DV) of vitamin C and moderate levels (10-19% DV) of several vitamins and vitamin K. It is consumed as a vegetable in curries, soups, and pickles. The main aim of Krishi Vigyan Kendra (KVK) is to reduce the time loss between generation of technology from the research institutions and its transfer to the farmers for increasing productivity and income from the agriculture and allied sectors on sustained basis. Krishi Vigyan Kendras (KVKs) are grass root level organizations meant for application of technology through assessment, refinement and demonstration of proven technologies under micro farming situation in a district (Das, 2007) ^[3]. Cauliflower cultivation in Purnea district during summer is adversely affected by high temperature. Under such conditions; existing cauliflower varieties need to be replaced by suitable high yielding variety which is tolerant to high temperature. According to (Gill and Sharma, 1996) ^[4], the best time of sowing of early cauliflower reported to be end of May to mid of July. Therefore, Demonstration was conducted during kharif season in Purnea district of Bihar, and carried out to yield 184.18 q/ha.

Materials and Methods

Front line demonstrations (FLDs) on an early cauliflower was conducted by KVK, Purnea at fifteen farmers field of varied villages viz., Malhariya, Devdha, Chandi, Dansar and Jalalgarh during cool season of 2013-14 and 2014-15. Different variables like plant height, curd weight, curd length, curd diameter, marketable curd yield and economics, were considered to evaluate. Few chemicals and fertilizers were also provided to farmers as inputs for the proper

establishment of demonstration at farmers field (showed in Table 1). The input and out puts prices of commodities prevailed during the study of demonstration were taken for calculating net return and benefit: cost ratio. On the basis of PRA report as well as field visit of KVK scientists, they have taken the decision to demonstrate and disseminate the technology as a new variety of early cauliflower by introduces it in Purnea district. They acquired all relevant information for the cultivation of early cauliflower then, they starts nursery raising for transplanting in the main field and plant protection measures were also taken under the supervision of KVK scientists time to time. The nursery was sown in the month of June 2013 and 2014 under protected structure, following all the recommended package and practices as suggested by

KVK scientists, 15 numbers of farmer were selected and accordingly demonstrations was conducted in five villages. Soil was found to be sandy loam to loam with low to medium fertility status as per analysis. The component of demonstration under front line technology (FLD) of early cauliflower was comprised of improved variety 'Sabour Agrim' with one check as local. Proper agronomical practices and application of balance dose of fertilizers as per soil test. NPK 120:80:80 kg/ha and FYM-200 q/ha as well as plant protection measure were followed. The total 01 ha area was covered in two consecutive years. In the demonstration, a control plot was also kept where farmer's practices used to grow, like local variety; use of fertilizers without soil test was carried out.

Table 1: Under the FLD programme farmers were provided following inputs

S. No.	Inputs	Dose	Water used for spray solution	Time of Application	Number of Application
1.	Urea	200 kg	Soil application	50 % Basal dressing and 50 % top dressing at 30 and 45 DAP	03
2.	Stomp	3.5 ltr	800 ltr/ha	Within 3 days after planting	01
3.	Poly feed 19:19:19	10g/ltr	500 ltr/ha	1 st spray at 30 DAP 2 nd Spray at 45 DAP	02
4.	Bioalgeen	3ml/ltr	500 ltr/ha	1 st spray at 15 DAP 2 nd Spray at 30 th DAP	02
5.	Tricoderma viridi	6kg/ha	Soil application	Apply @2.4kg/acre at the time of transplanting	01
6.	Bavistin	2g/ltr.	500 ltr/ha	Drenching 2 time at 15 and 30 days in nursery	02
7.	Delta trap	5 pairs/ha	Field application	At the time of aphid appearance	01

Result and Discussion

Plant Height

The plant height of Cauliflower varied from 46.64 cm to 74.82 cm. The perusal of data (Table 2) revealed that plant height was maximum (74.82 cm) in case of demonstrated variety (Sabour Agrim) It was also found that Sabour Agrim showed highly significant effect on plant height. Maximum plant height in Sabour Agrim might be attributed to the genetic makeup of particular genotype and suitable climatic conditions which was in conformity with the findings of (Ara *et al*; 2009)^[1].

Curd Length

The curd length of cauliflower varied from 7.89cm to 12.49 cm. It was found that curd length of Cauliflower was maximum (12.49 cm) with the Sabour Agrim and minimum (7.89 cm) with local cultivar (check). It was also found that demonstrated variety showed highly significant effect on curd length than local types. The results related to curd length were in agreement with those reported by (Srivastava *et al*; 2002)^[7].

Curd diameter

It was observed that curd diameter varied between 8.24 cm. to 14.68 cm. Maximum curd diameter (14.68cm) was observed in the demonstrated variety (Sabour Agrim) where as minimum (8.24 cm.) was registered in the local type. It was also found that curd diameter in Sabour Agrim was significantly superior to the local type (Table 2). Maximum curd diameter might be due to genetic makeup of Sabour Agrim and interaction of suitable temperature and climatic conditions received by plants as early sown crop.

Marketable curd weight

Marketable curd weight was noted affirmatively, ranged from 282.22 g to 398.00g. (Table-2). As per perusal of the data it was revealed that, maximum marketable curd weight (398.00g) was obtained by demonstrated variety Sabour Agrim. Whereas, lowest was proclaimed in local type i.e.

282.22g. It was also found that high marketable curd weight of Sabour Agrim proven significant superiority as compared to local types (check). The higher marketable curd weight in Sabour Agrim attributed to the genetic makeup of genotype and suitable climatic conditions during experimentation period. Result of present investigation was in agreement with the observations made by many researchers (Jana and Mukhopadhyay, 2006; Ajith kumar and Savani, 2007)^[5, 1]

Marketable curd yield

Data present in the (Table-2) showed significant differences among the cultivars. The values for marketable curd yield varied between 154.06 q/ha to 184.18 q/ha. The demonstrated variety (Sabour Agrim) recorded maximum marketable curd yield i.e. 184.18 q/ha which is significantly higher than local (check) i.e. (154.06 q/ha).

Economic analysis

The concept of demonstration was to disseminate and evaluate the technology (varietal performance) of early cauliflower through progressive farmers in Purnea district of Bihar. The cultivation of early cauliflower under FLDs showed statistically significant performance. The curds were harvested at edible stage and sold in the local market. The total cost of cultivation was calculated Rs. 45,500.00 and net return of Rs. 285,754.00 from an area of 1.0 ha with B: C ratio 6.28, which was an agreement with the study made by (Singh *et al*; 2015)^[6]. The detail of economic analysis is shown in Table-3.

Significance of Sabour Agrim as stated by Farmers

- It has better yield as compare to local cultivar
- The average size of Sabour Agrim curd is about 14.68 cm as compare to Local Varieties i.e. 8.24 cm.
- Colour, shape, size and quality of Sabour Agrim are much better and attractive as compare to local cultivar.
- It can be cultivated in early and mid season successfully.
- It is a good option of income generation during autumn season.

- There is less incidences of pest and disease as compare to local cultivar.
- Former got remunerative price (Rs. 30/-curd) in local market as compare to local (Rs. 15/- curd)
- Marketing is very easy due to scarcity of early cauliflower in local market

Table 2: Performance of growth and yield of cauliflower (*Brassica oleracea* var. *botrytis*) under FLD Programme

Treatments	Curd weight (gm)			Curd length (cm)			Plant height (cm)			Curd diameter (cm)			Marketable curd yield (q/ha)		
	2013	2014	Mean	2013	2014	Mean	2013	2014	Mean	2013	2014	Mean	2013	2014	Mean
Local cultivar (Check)	272.40	292.00	282.22	7.66	8.13	7.89	45.00	48.30	46.648	7.93	8.54	8.24	144.50	163.70	154.06
Sabour Agrim	371.30	424.70	398.00	11.06	13.92	12.49	71.49	78.16	74.826	13.29	16.09	14.68	183.5	184.90	184.185
C.D. (0.5%)	22.76			1.01			8.50			1.28			6.15		
SE(m)	5.64			0.25			2.11			0.31			1.52		
SE (d)	3.71			0.35			2.98			0.449			2.15		

Table 3: Economic analysis of evaluated cultivars

Crop / Enterprise	Technology demonstrated	Average Yield of demo plots (qt/ha)	Yield of local Check (qt/ha)	Increase in yield (%)	Avg. Cost of Cultivation. (Rs/ha)	Avg. Gross Return (Rs/ha)	B:C Ratio
Early Cauliflower	Variety- Sabour Agrim	184.18	154.06	19.55	45,500	285,754	6.28

**Fig 1&1(a):** Field View of FLD and Farmers Interaction

Conclusion

The FLDs showed a significant positive result and provided the researcher an opportunity to demonstrate the productivity potential and profitability of the latest technology (Intervention) under real farming situation, which they have been advocating for long time. This variety was newly cultivated in Purnea district. The productivity gain under FLDs over existing practices of scientific cultivation of early cauliflower production created greater awareness and motivated the other vegetable growers to adopt this variety in the district. This variety was very much useful to increase yield as compare to local varieties. Therefore, it can be recommended that, farmers of kosi zone-II of Bihar can obtain premium price through adopting of demonstrated package and practices. Farmers are inspiring other farmers in his area to grow early cauliflower for better returns.

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