

# Performance of Capsicum and Gerbera under Naturally Ventilated Polyhouse at Nadia District of West Bengal

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**Abstract**—The present extension work entitled “Performance of Capsicum and Gerbera under Naturally ventilated Polyhouse at Nadia district of West Bengal” was carried out at Nakashipara Block of Nadia District, West Bengal under MIDH scheme during the financial year 2014-15 and 2015-16. The project work was laid out at two sites of Nakashipara block and both these high value crops have been grown under Naturally Ventilated Poly house. Time to time technical support and all other information regarding cultivation practices and other logistic support were given by the departmental officials to promote this technology. The observations were recorded on various aspects such as comparison of yield and quality of the crop with open cultivation, increase of income and specially adoption of this technology by the farmer. It was observed that about 4kg per plant yield from capsicum and more than 35 nos. of flower per plant have been obtained. So the present project work concludes that farmers of Nakashipra block have earned about 2.5 lakh net annual return from 1000 sq.m. land from vegetables. Similarly about 4.0 lakh net annual returns would be possible from 1000 sq.m. land by adopting gerbera cultivation under protected condition. Hence farmers may adopt this technology.

## 1. INTRODUCTION

In this transformation era from traditional subsistence agriculture to commercial production, it is obligatory to consider the profitability of vegetable and flower production which certainly depends upon the productivity, quality and timing of growing the crops. Vegetable and flower cultivation has been acknowledged as one of the most viable diversification option for improved farm productivity and sustained farm incomes. The visionary plans of agriculture development have laid major emphasis on vegetable and flower production and its successive expansion to the land holdings of small and marginal farmers. Protected cultivation of vegetable as well as high value flowers provides technical solution to the challenges of marginal and small land holdings. The flexibility in vegetable or flower production programmes

under protected conditions can be adjusted and changed for remunerative returns according to the needs, small land holdings, changing food habits of people, increased awareness for quality food and nutritional security which have led to the rapid increase in demand of vegetables and flower specially in urban area To meet this ever increasing demand of vegetables as well as economic upliftment of farmer’s society area expansion under vegetable and flower cultivation, quality seed/planting material and improved agro-have not yielded satisfactorily and alternative lies in the precise, intensive and advanced technologies like greenhouse or protected cultivation.

Greenhouse enables farmer to make best use of the sunlight and even the smallest unheated structure allow extended growing seasons and production of quality techniques crops with high productivity with full exploitation of genetic potential. Few farmers in West Bengal specially in new alluvial zone are installing poly houses for off-season vegetable production, high value flower production and for intensive use of their small land holdings. Round the year occupancy of poly houses with high value cash crops like tomato, capsicum and cucumber, lettuce, spinach, coriander, gerbera orchid, carnation, anthurium are very important for maximizing cropping intensity on one hand and ensuring remunerative returns on the other hand to the small and marginal farmers of the state.

Cultivation of capsicum (*Capsicum annuum* L.) and gerbera (*Gerbera* sp.) in the cost effective naturally ventilated poly houses is proving to be a very remunerative venture to the green house growers despite low crop productivity due to lack of appropriate technologies as these are fetching maximum returns in the markets. Capsicum belongs to nightshade family (Solanaceae). The capsicum (*Capsicum annuum* L.) is

commonly known as sweet pepper, bell pepper or green pepper. They differ from common hot peppers in size and shape of the fruits, capsaicin content and usage.

Despite its economic importance, growers are not in a position to produce good quality capsicum with high productivity due to various biotic (pest and diseases), abiotic (rainfall, temperature, relative humidity and light intensity) and crop factors (flower and fruit drop). Due to erratic behaviour of weather, the crops grown in open field are often exposed to moisture stress, fluctuating levels of temperature, humidity, wind flow, *etc.* which adversely affect the crop productivity. Besides this, limited availability of land for cultivation also hampers the production potential. Hence, to obtain a good quality produce and production during off-season, there is a need to cultivate capsicum under protected conditions.

Gerbera (*Gerbera jamesonii*) belong to the family assteraceae is an important commercial flower crop grown throughout the world in a wide range of climatic condition. It is a useful as cut flowers, pot crops, and bedding plants planted outdoors in full sun. They can be planted in dish gardens, mixed containers, patio pots, or traditional containers for use as holiday and seasonal gifts. It is a herbaceous, stem less plant and makes a rosette growth. Leaves are petioled, lanceolate and deeply lobed and arranged at the base of the plant. Flower heads are solitary, composite having conspicuous ray floret in one or two or more rows with various ranges of attractive colour may be single, double or semi-double arrangement of ray florets (Arora J S, 2008).

Gerbera can be grown under open as well as under protected condition. But it is better to grow under controlled environment condition i.e. under green house where adequate plant care is taken up by the growers throughout the year. Their long lasting keeping qualities with wide range of colour attract the buyers. Beside this it is highly remunerative crop for the farmers.

Keeping above facts in view, we are more emphasizing for poly house cultivation of capsicum, gerbera and other high value cash crop at Nadia dist. Through Mission for integrated development of horticulture (MIDH) scheme under the Department of Food Processing Industries and Horticulture, Govt. of West Bengal with following objectives:

- Standardization of package of practice under poly house for gerbera and capsicum at Nadia dist.
- Cover more and more area under poly house
- Economic upliftment of farmers society by earning more from a small unit area of land

(Specially for small and marginal farmers)

## 2. METHODOLOGY

The present extension work “Performance of Capsicum and Gerbera under Naturally ventilated Polyhouse at Nadia district of West Bengal” were carried out at different block of Nadia

district specially at Nakashipara block under “Mission for Integrated Development in Horticulture” Scheme by the team Dept. District Horticulture Office, Nadia District, Dept. of Food Processing Industries and Horticulture, Govt. of West Bengal during the financial years 2014-15 and 2015-16. Seedlings of capsicum were raised in plug-tray and 40 days old were transplanted in a plot size of 2 x 3 m i.e. 6 sqm at 45 cm x 60 cm spacing during third week of September. Tissue culture plantlet of gerbera were planted under the poly houses. Farmers training, exposure visit, technical guidance regarding the recommended package of practices, time to time field visit was followed for raising a healthy crop. Financial support was provided by different nationalized bank to the farmer for raising their crop. After completion of the successful construction of the naturally ventilated polyhouse the 50 % subsidy of the project cost i.e. 5,30,000/- (1000sq.m.) were disbursed to their loan account. The observations were recorded on the performance of newly introduced crop at farmer’s field of Nadia District of West Bengal under protected condition, yield of the crop, increase in income of the farmer, coverage of poly house at Nadia District, introduction and adaption of new technology, efficient water management though dip and sprinkler irrigation, benefit cost ratio, public-private partnership, formation of farmers producer organization for marketing of the crop etc.

## 3. RESULT AND DISCUSSION

Earlier gerbera and capsicum were not commercially cultivated by the farmers of Nadia District. After the intervention of the green house cultivation technology now some progressive farmers of Nakashipara block have selected this crop as a high cash remunerative crop as both of these crops i.e. capsicum and gerbera performed well under protected condition at project sites of Nakahipara block, exhibiting the possibility of using this new technology may be adopted though the farmers of this district.

The data enumerated in table no.1 indicate that more average yield per plant was obtained in poly house (3.0 Kg) compare to open field (1.3 kg). It was also reflected that increase in yield under poly house is due to more plant height, more nos. of fruits per plant as well as duration of the crop under protected condition compare to open field. This increase in yield is due to better management practice as well as lesser environment hazard under protected condition. The higher fruit yield under this condition may be attributed to the favourable climatic conditions that prevailed under polyhouse and also due to its protective ability against major abiotic stresses, which reduces the effect of the excess rainfall, water logging, and provide controlled environment (3–4°C higher temperature than open field condition) to the crop (Singh et al., 2003 and Singh et al., 2010) leading to higher vegetative growth, contributing to more number of flowers, higher per cent of fruit set resulting more number of fruits. Similar results were obtained by Nagendra Prasad (2001) and Brar et al. (2005) who reported highest yield under polyhouse conditions.

In the poly house of gerbera a total nos. of 30-35 flowers were produced per plant per year from a single gerbera plant.

A perusal of data (Table 2, Table 3 and Table 4) showed that there is more annual net return from capsicum and gerbera cultivation under protected condition as compare to open field. Though initial cost for construction is more but after the repayment of loan farmers may get is higher income from poly house cultivation. Beside this there are no chances of crop loss due to natural calamities.

The data enumerated in table 5 indicate that this technology was started from financial year 2011-12 with coverage of only 2000 sq.m. area and now during financial year 2015-2016 the coverage of poly house cultivation at Nadia District specially at Nakashipara block has increased upto 45,000 sq.m. During the financial year 2017-18 it was observed that more than 70,000 thousand sq.m. of coverage in the district.

It is cleared that drip irrigation system has maximum water use efficiency i.e. 90-95%. So it is an effective method of irrigation. Now the farmers of Nadia District are aware about the drip irrigation system. Though installation of drip irrigation system is more costly than other irrigation but it gives long term effect on crop production such as quality of the crop, less diseases and pest attack, save irrigation cost and weeding cost and ultimately increase yield of the crop.

By seeing the success of this new technology, farmers of different villages Nakashipara Block has showed interest to adopt this technology In each financial year they are applying for this at District Horticulture office.

Beside this they formed small group namely Farmers Interest Group and collectively one FPO namely Nakashipara Farmers Producer Company with a members of 1000 Farmers has been formed under National Vegetable Initiative for Urban Cluster scheme. Farmers of different groups are now cultivating capsicum and other vegetables under low cost poly house of bamboo structure, shade net. Registration of FPO has already been done under



**Fig. 1: Gerbera under Poly house at Nadia District of West Bengal**



**Fig. 2: Capsicum under Poly house at Nadia District of West Bengal**

**Table 1: Comparison of yield and other character of capsicum under open and protected condition:**

Sl. No.	Characters	Capsicum under Open field	Capsicum under polyhouse
1	Days to first Flowering	45-50 DAT	41-45 DAT
2.	Plant Height	70 cm	125 cm
3	Average Nos. of fruit per plant	8 Nos.	15 nos.
4	Duration of crop	135 days	195 days
5	Yield per plant	1.3 Kg	3.0 Kg
6	Diseases and pest attack	More	Very less

**Table 2 Net income from gerbera cultivation under poly house (1000 Sq.m.):**

Cost of construction (1000 Sq.m)	Rs.10,60,000/-
Cost for planting materials	Rs. 6,10,000/-
Total cost (Construction + planting materials)	Rs.16,70,000/-
Bank Loan (90%)	Rs.15,03,000/-
Subsidy Aailed under MIDH (50%) for construction of poly house	Rs.5,30,000/-
Subsidy availed under MIDH (50%) for planting material	Rs.3,05,000/-
Total Subsidy availed under MIDH (50%)	Rs.8,35,000/-
Annual recurring expenditure	Rs. 2,40,000/-
Yield of Crop/Product	Rs.2,40,000 Nos. of Flowers per year
Average rate per flower	Rs. 3/per flower
Gross Income	Rs.7,20,000/- per annum
Net Income	Rs. 4,80,000/- per annum

**Table 3 Net annual income from Capsicum and Palak acultivation under poly house (1000 Sq.m. area):**

Cost of construction (1000 Sq.m)	Rs.10,60,000/-
Cost for planting materials	Rs. 1,40,000/-
Total cost (Construction + planting materials)	Rs.12,00,000/-
Bank Loan (90%)	Rs.10,80,000/-
Subsidy Availed under MIDH (50%) for construction of poly house	Rs.5,30,500/-
Subsidy availed under MIDH (50%) for planting material	Rs.70,000/-
Total Subsidy availed under MIDH (50%)	Rs.6,00,000/-
Annual recurring expenditure	Rs. 70,000/-
Yield of Crop/Product	Capsicum: 75q. Palak: 60 q.
Average market rate of the crop	Capsicum: Rs.2500/q Palak: Rs.2000/q
Gross Income	Rs.3,07,500/- per annum
Net Profit	Rs.2,37,500/- per annum

**Table 4: Comparison of net annual income from poly house cultivation and open field.**

Net Income	Open field (1000 sq.m)	Protected cultivation (1000 sq.m.)
Net annual income from vegetable cultivation	Rs.25,000/-	Rs.2,00,000/-
Net annual income from Flower cultivation	Rs.40,000/-	Rs.3,00,000/-

**Table 5: Year wise Coverage of polyhouse at Nadia District:**

Financial year	Area under poly house:
2011-12	2000 sq.m.
2012-13	6000 sq.m.
2013-14	15000 sq.m.
2014-15	30000 sq.m.
2015-16	45,000 sq.m.
2016-17	60,000 sq.m.
2017-18	74,000 sq.m

the company act during the financial year 2015-16. They established their own office and performing their business work.

Recently FPO of Nakashipara block has started business of seed and pesticides in Public Private Partnership Mode with IKSL, Monsanto, Bharat seeds and Chakra seeds. By adopting this farmers of Nakashipara block get an opportunity to purchase seeds of different vegetables, field crop as well as pesticides from single window with lower price than local market. The FPO also purchases products of farmers with reasonable price and collectively sends to Kolkata Market. Farmers are now getting more market prices for their product as lesser interference of middle man.

#### 4. CONCLUSION

It may be concluded from the study that there is an immense scope for expansion of area and production of capsicum and gerbera cultivation under protected condition at Nadia District as well as in other suitable parts of West Bengal. The cost of cultivation for capsicum and gerbera is somewhat higher but due to good demand in market, the returns are also very good. From the results of present extension work it is concluded that, cultivation of capsicum and other vegetables as well as gerbera under naturally ventilated poly house resulted in more number of fruits/ flower per plant, increase harvest duration, yield per plant and ultimately it increase the net annual income as compare to open field cultivation. Beside this technology other modern cultivation concept such as nursery raising in plug tray, mulching, drip irrigation can also play a pivotal role in near future at Gangetic plains. So this technology can easily be disseminated for commercial cultivation of horticultural crops.

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