

Cut Flower Production: A Source of Incremental Income for the Marginal Farmers of the State of West Bengal in India

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Abstract—The basic objective of this paper is to measure and compare the profitability of investments made by the small and marginal farmers of the state of West Bengal in floriculture shifting from the traditional cultivation of paddy. A comparison of IRR is made to establish the fact that cultivation of flowers yield higher returns farmers whose land size is so small that viability of paddy cultivation is raising a question mark. A detailed study of the price behavior of the flower crop has been carried out in which the factors leading to the volatility of the price and the dispersion of the range have also been discussed. Finally the incremental incomes of the farmers have been calculated with the help of imputed income from paddy cultivation and the reported income from the selected flowers. The study shows that the farmers stand gainers if they opt for flower cultivation.

Keywords—Bazar Samity, Floriculture, Marginal Farmers.

I. INTRODUCTION

IN the recent years in the rice producing belt of Asia crop diversification has become a popular strategy to maximize the use of land, water and other resources. If carried out appropriately, diversification can be used as a tool to augment farm income, generate employment, alleviate poverty and conserve precious soil and water resources. In the state of West Bengal in India, diversification in cropping pattern is a very recent phenomenon other than the case of plantation crop from the pre-independence period. It is basically a rice producing state which has achieved a very high level of productivity in paddy cultivation during the second phase of *Green Revolution* and is now the largest producer of rice in the country. However diversification towards high value crops is being considered as a way to increase the contribution of non-rice crops to output ratio to attain higher agricultural growth rates in the future. Moreover in a state where the fragmentation of land size has taken place to such extreme that the size of land holding of more than eighty percent of the farmers is less than 0.5 acres diversification in agriculture is now becoming almost a necessary feature for the small and marginal farmers as the traditional cultivation of paddy is becoming non-viable. While high value crops have been gaining in land area floriculture, also is increasingly being regarded as a lucrative opportunity to increase per unit return. The art of growing flowers is not new to India as well as in the

state, growing loose flowers mostly for worshipping, garland-making and decoration form the backbone of the Indian floriculture, which is mostly in the hands of small and marginal farmers. Twenty years ago, the growth was mainly focused on foliage plants for household purposes. The impetuses in cut flowers like rose, gladiolus, tuberose, chrysanthemum, carnation, gerbera, anthurium, orchids and lily has acquired momentum in the recent years. Enormous genetic diversity, varied agro climatic conditions and versatile human resources offer the state a unique scope for diversification into new avenues which have not been explored to a greater extent till now. If exploited in a proper manner this might help in augmenting the revenue of the impoverished farmers of the state.

II. SOURCE OF DATA

A. Primary Data

The study is based on a primary data survey carried out in collaboration with National Bank for Agricultural & Rural Development, (NABARD) [6], India, in the major flower producing districts of West Bengal which are Nadia, North 24 Parganas, South 24 Parganas, Howrah, PurbaMedinipur, Hooghly, Darjeeling and Jalpaiguri. The flower producing areas were purposefully selected in consultation with the District Horticulture Mission Office. Some members of the local Flower Producers' Association and members of Gram Panchayats were instrumental for selection of the blocks and villages. The study was conducted in the state during January 2010 and June 2010. A two stage sampling technique was used to select the producers. A survey was also conducted in the four major market sites, namely Jagannath Ghat, Thakurnagar Bazar, Nokari Bazar and Dhantala Bazar to collect primary information on marketing and price trend of different variety of flower products.

B. Target Population

Small and marginal farmers account for about three-fourth of the total operational holdings in the state of West Bengal. They operate over one-fourth of the total area cultivated and their average land holding varies between 0.5 ha to 1.2 ha. Majority of these small and marginal farmers cultivate mainly low value, subsistence crops of paddy. In the absence of adequate farm and non-farm employment opportunities, they are also forced to live below poverty line. Hence arisen the need for commercialization and diversification and a proper

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integration of the farms with local and global markets with a view to increase income in this sector.

C. Secondary Data

Additional data were also collected from secondary sources different offices such as the Agriculture and Rural Development offices of the zones and districts. Time series bid price information was also collected from Agricultural Directorate of West Bengal, Department of Food Processing Industries [1], CMIE reports [3], and Horticulture and West Bengal State Horticulture Development Society [8], and APEDA [2], to understand the trends in area, productivity and prices of flowers produced in the state. Data on paddy cultivation was obtained from Farm Size Management and Cost of Cultivation [7], of the state of West Bengal.

III. COST OF PRODUCTION

In this section the tables represent the average cost of cultivating flowers per acre in the different districts under consideration. The exercise has been undertaken for the major cut-flowers of the state where consistent and sufficient data was available. Since the time between planting and harvesting is usually three to four months in case of these flowers, therefore average cost has been calculated with three months time period. Any cost borne by the farmer after these initial three months is minimal and are therefore ignored. The following tables analyze the variable cost of producing cut flowers Rose, Gladiolus and Tuberose by the selected farmers. The price of the factors are recorded as reported by the farmers and are measure of actual cost incurred by them.. This calculation, however, does not account for overhead costs, though the opportunity costs of the fixed asset are small. In case of flower cultivation the initial cost at the time of plantation is the highest and later on the costs become minimal. While the basic factors of production remains the same the pattern of utilization differs in case of each flower. The factor inputs are common to all the varieties. Also during survey it was discovered that as the land size differed widely the requirement of input quantities varied and so did the rates of some factor inputs. Unlike any other crops, cost of flower production therefore presents a tremendous challenge in terms of factor utilization analysis. The values of the explanatory variables like labor, non-human labor, land, fertilizers, pesticides, irrigation and agricultural machineries have been collected directly from the farmers of the different villages during the time of survey.

A. Share of Input Component Cost- Rose

Among the sample districts the main concentration of rose cultivation has been observed in of Bagnan I and Bagnan II of the district of Howrah, Krishnanagar I and Ranaghat I of Nadia district and Bishnupur I and Budge. Budge I of South 24 Parganas. The varieties of rose grown by the farmers in these three districts are almost same. Table I presents data on the breakup of average cost of cultivation of Rose per acre of the selected farmers in the sample districts. The highest average cost of production has been observed in the district of Howrah,

whereas the average cost is almost similar in the districts of Nadia and South 24 Parganas. The most important factor in terms of cost in all the three districts are family labour and hired labour. The next important factor in case of flower cultivation as in case of any other crop is the rent on land. Most of the farmers are either marginal farmers whose average land area is less than 0.3 acres or have taken land in lease against rent. The value of rent is the highest in South 24 Parganas followed by Howrah and Nadia. The use of machineries like tractors in the case of cultivation of rose is only at the time of land preparation. The study result shows that 80% of the producers have less than 0.3 acre of irrigable land. It is also to be noted that the expenditure on manure is comparatively more than the chemical fertilizer as there is extensive use of cow dung and oil cakes during land preparation. Flowers are picked in the evening when the buds just begin blooming. Around 2% wastage occurs at this level as flowers with more than two bloomed petals are not marketed. However the farmers refused to consider this as a loss. According to them since these flowers are not plucked therefore they are not a part of the output.

TABLE I
AVERAGE COST OF CULTIVATION OF ROSE PER ACRE (RS)

Districts	Howrah	Nadia	South 24 Parganas
Rent on Land	2909	2801	3138
Seed/Sapling	1419	1666	1686
Manure			
Cow dung	300	1256	234
Oil cake	192	845	100
Fertilizer	511	1406	404
Pesticides	276	189	323
Irrigation	561	794	627
Labour			
Family Labour	5703	4625	5857
Hired Labour	8166	4881	6561
Machineries	2175	1405	880
Total	22212	19868	19810

B. Share of Input Component Cost- Tuberose

Tuberose occupies a very special position among the ornamental bulbous plants because of its elegance and fragrance. The major concentration of Tuberose cultivation is in the districts of south Bengal. Farmers of Gaighata and Rajarhat I blocks of North 24 Parganas, Krishnanagar I and Ranaghat I blocks in Nadia and Panskura I and Panskura II of Purba Medinipur are growing tuberose on a commercial basis. Tuberose is marketed both as cut flowers and as loose flowers. The Table II presents data on the breakup of average cost of cultivation of Tuberose per acre of the selected farmers in the sample districts. The average cost of production per acre is highest in North 24 Parganas, followed by Purba Medinipur and then Nadia. The highest cost component once again is labour , actually hired labour. Although there are some aggregation errors due to small area allocated to the flower the fertilizer application rate appears to be much higher in Nadia than the other two districts In case of flower cultivation use of compost is equally important as fertilizers. Oil cake is always required for land preparation before the bulbs are planted. Machineries used are tractors at the time of land preparation. Usually these marginal farmers do not have tractors themselves and rent a tractor or a pair of bullocks from the

large farmers. There is therefore a case of dependency of the small farmers in terms of initial factors of production. Often planting gets delayed by three to four days or almost a week on account of unavailability of these factors. However as most farmers take ratoon crops for one or two years, by allowing the clump of preceding years' crop to grow undisturbed in situ and thereafter, following the usual cultural operations, the cost of initial investment actually becomes zero. The yield from the first ratoon crop is more or less similar to the first year and can even be better at times.

TABLE II
AVERAGE COST OF CULTIVATION OF TUBEROSE PER ACRE (RS)

Districts	North 24 Parganas	Nadia	Purba Medinipur
Land	3922	3084	3116
Preparation			
Seed/Sapling	277	264	274
Manure	112	150	135
Cow dung	200	220	250
Oil cake			
Fertilizer	589	680	650
Pesticides	786	766	750
Irrigation	615	306	425
Labour	5937	2713	4725
Family Labour	8309	9809	9025
Hired Labour			
Machineries	595	571	575
Total	21342	18563	19925

C. Share of Input Component Cost- Gladiolus

Gladiolus is one of the most important bulbous flowering crops grown commercially. It is grown abundantly in Darjeeling and Jalpaiguri districts by rotation almost throughout the year and also in the districts of North 24 Parganas, South 24 Parganas and Nadia in the winter months. In the blocks of Kalimpong I and Mirik of Darjeeling farmers are concentrating on gladiolus cultivation for a long period of time. The variety of gladiolus grown here are also many. Table III gives the breakup of average cost of growing gladiolus in the different sample districts. In growing gladiolus the major expenditure is in case of land preparation. The reason behind it is that in the climate of the districts of Jalpaiguri, North 24 Parganas, South 24 Parganas and Nadia are not always conducive for growing Gladiolus. The farmers instead try to combat this factor with better land preparation. In case of Darjeeling there is a unique situation pertaining to mountains. Since only about one third of the land can be cultivated of an acre, a farmer who is growing flower on one acre of land is actually cultivating in three acres. The land value is calculated accordingly. That is why the land component is the highest in case of Darjeeling. The next important component of cost here is the bulbs. Bigger and better quality bulbs are higher priced. Very little labour is required for growing gladiolus and farmers in most of the cases utilize family labour in this case. In Darjeeling however the proportion of hired labour is more than that of family labour. Another important cost component is that of irrigation. The flower growers of Darjeeling depend on the water of the 'jhoras' for irrigation. Often an individual farmer has to bring in water through pipes stretching for two to four kilometers. However the pipes are usually a onetime cost and can be used for quite a few years, therefore can be treated as one time cost

at the beginning. In the other districts watering the plants are done thrice a week mostly by pumps and labours working for two to three hours at a time.

TABLE III
AVERAGE COST OF CULTIVATION OF GLADIOLUS PER ACRE (RS)

Districts	North 24 Parganas	Nadia	South 24 Parganas	Darjeeling	Jalpaiguri
Land	7030	5768	6850	7772	6450
Preparation					
Seed/Sapling	3205	3384	3650	5380	5200
Manure	37	500	350	200	175
Cow dung	50	448	400	174	200
Oil cake	68	645	150	127	150
Fertilizer	148	124	75	102	100
Pesticides	147	136	100	1039	1500
Irrigation					
Family Labour	2688	1649	1985	1243	1550
Labour					
Hired Labour	303	460	600	2516	1200
Machineries	106	260	80	45	85
Total	13783	13377	14240	18598	16610

IV. PRICE BEHAVIORS

The pattern of flower prices has been analysed as per the information recorded from the concerned district's Bazar Samity or Flower Market Yard, farmers and different intermediaries. From the records of Flower Associations and Bazar Samiti season-wise minimum and maximum price of flowers were recorded. Thereafter, month-wise average price of particular flowers were estimated. Care was taken while handling the prices at the entry level of Bazar Samiti and exit level of Bazar Samiti. The average farm gate price was estimated in both the cases, when the stock was directly sold from the farm to unorganised intermediaries and if it was sold through Bazar Samiti taking into account of cost of transportation and intermediaries, if any.

TABLE IV
MINIMUM AND MAXIMUM PRICE OF FLOWERS AT FARM GATE

(Rs./dozen)	Rose	Tuberose	Gladiolus
Lowest Price	12	10	20
Medium Price	30	15	35
Highest Price	48	40	70
Average Price	26	18	36

A. Maximum and Minimum Prices

The minimum and maximum prices of different flower at farm gate as depicted in the Table IV below are recorded from the respondent farmers. In case of the farmers of south Bengal districts, Howrah, Hooghly, North 24 Parganas, South 24 Parganas and Purba Medinipur, these prices were recorded from the farmers when they sold their product at the nearest bazaar or at the main flower markets of Jagannath Ghat, Thakurnagar Bazar, Nokari Bazar and Dhantala Bazar. The farmers of Darjeeling and Jalpaiguri on the other hand sell their product to the to the Flower Samities or Agents who then market the products. Flower prices fluctuate very frequently over a very wide range. There are many factors responsible for this marked fluctuation in the flower price. They may be summarized as follows

1. The Demand Aspect

Demand for flower can be categorized into two different types – one is the regular demand and other is the special demand. Regular demand again can be categorized in to two broad types – one is the original household demand for traditional flowers and the other is the demand for exotic flowers by the different hotels and offices which is the result of changing life style. This demand more or less remains steady throughout the year, though it has been on the rise over the last few years. Special demand on the other hand has increased immensely over a period of last five years or so. This type of demand is associated with special occasions like marriage ceremonies, birthday parties, Bengali New Year, all National Days, Valentine's Day, any cultural meet, Durga Puja and Other Pujas (religious festivals).

2. Time Frame

Flower prices tend to fluctuate with time in a day. In the morning the prices are high as the major buyers make their purchase from the farmers at the five markets that were visited at the time of survey. Usually markets start very early in the morning, from 5:30 a.m., in Nokari and Dhantala. In Gaighata on the other hand the market starts around 11 a.m. Jagannath Ghat is a permanent market place where trading takes place all around the day. However the price has a tendency to fall as the day goes on. In Jagannath Ghat the prices again picks up towards the end of the day as vendors buy flowers for the next day. Price varies quite largely in all the markets. However no uniform tendency has been observed in the cardinal difference in the prices. Price of most commonly sold flower, can vary between Rs.5 a piece to Rs.0.25 a piece.

3. Weather

Too much rain or too much summer heat both are deterrent for selling flowers. As a result flower prices tend to be low during the rainy season and the extreme summer. During the monsoon sometimes the farmers would sell at absurdly low prices just to get rid of the product.

4. Arrival of Stock

In times of high demand erratic arrival of flowers also causes price differentials. In monsoon for example the flowers for all occasions are rose and tuberose. If heavy rain deters the farmers from reaching the market then whatever stock arrives is sold at substantial high price. A dozen of the double variety of tuberose can then be sold at Rs.120.

B. Average Prices from 2006-07 to 2008-09

The mean minimum and maximum price for the period of last three years of Rose, Gladiolus and Tuberose is exhibited in Table IV. It is observed that there had been some variation in the average prices in the recent years. The maximum prices of cut flowers have recorded a steady increase. Average minimum price is calculated on the basis of price in the lean months from mid April to mid June and again mid August to mid September. The average maximum price is calculated as a mean value of the price during different occasions. However 45% of the respondent farmer reported that price could go

down to zero in the lean periods when they threw away their product. They also said that the price during the 'marriage season' or any other occasion could go very high beyond their expectations. Price of Rose could go up to Rs.25 a piece during Valentine's Day or a marriage day.

TABLE V
TREND IN AVERAGE PRICES (RS)

Year	Rose (Rs./dozen)	
	Minimum	Maximum
2006 - 2007	10	30
2007 - 2008	10	36
2008 - 2009	12	48

TABLE VI
TREND IN AVERAGE PRICES (RS)

Year	Gladiolus (Rs./dozen)	
	Minimum	Maximum
2006 - 2007	15	50
2007 - 2008	18	60
2008 - 2009	20	70

TABLE VII
TREND IN AVERAGE PRICES (RS)

Year	Tuberose (Rs./dozen)	
	Minimum	Maximum
2006 - 2007	5	20
2007 - 2008	8	30
2008 - 2009	10	40

The trend in price however is distinctively positive. The maximum prices quoted by the respondent farmers have in most cases increased by more than 40% in a span of three years. Even the minimum prices, have increased by at least 20% during the same period. However the fluctuations in price have been very wide and still continue to be so. While some sort of prediction can be made regarding the maximum level of price it is actually not possible to find a floor to the minimum price.

C. Variation in Prices from the Average Prices of the Year January, 2010

The main sources of market information are traders and brokers. The majority of farmers become aware of the price upon their arrival at the market place. In most cases, the prevailing prices from the previous market days are considered when the farmers deliver the flowers to the wholesalers without allowing remunerations for the difference in quality, seasons and the change in market conditions. Brokers often deliver information about declining prices in the terminal markets to farmers so as to convince them to receive lower prices for what they will sell. Traders themselves lack market information outside their vicinity. Traders in Nokari Bazar and Thakurnagar Bazar, for instance, do not get precise information about prices in Kolkata markets to adjust the sales prices. Lack of market information severely affects the producers since they are the ones bearing losses sooner or later.

The prices of flowers are to say the least, absolutely volatile. The survey has shown that unlike any other agro-based product price of flowers varies over a wide range in a span of very short period, sometimes even in a span of a day.

Almost 90% of the respondent farmers reported very high price in the early morning and a very low price at the end of the day. In this section first an attempt has been made to examine the month wise variations from the average of the year during the study period and then variation over the span of a day has been recorded from the five different markets surveyed. The following Tables V-VII depict the month wise variations in the prices of the selected flowers.

A very important fact regarding the study of trend in price in case of flower as obtained from Economic Review [5] is that there are no definite patterns observed as to the variation. Moreover since different types of flowers have different calendar year of production and different demand pattern, therefore it has not been possible to analyze the trends under the same umbrella. Rose, for example is produced throughout the year with the best blooms during December to March.

Demand for rose also reaches the highest level during this period. Both supply and demand therefore is high during this period of four months, but the price is high as well. The price behaviour indicates the importance of relative elasticities of demand and supply. A rightward shift in both the supply and the demand curve actually leads to a rise in price as the demand curve is relatively less elastic as compared to the supply curve during periods of high demand. Similarly during the lean months the demand becomes more elastic than supply and a simultaneous increase in both demand and supply actually leads to a fall in price. The nature of market for Gladiolus is on the other hand a little different. It is used as a decorative flower in offices and hotels. As a result there is a constant demand for a certain amount of this flower throughout the year. The fluctuation in price is due to the floating part of the market which is relatively more elastic. Also the vase life of Gladiolus is longer than that of Rose which allows more bargaining power on behalf of the producers and hence prices tend to be on the higher side. The market for Tuberose is in fact quite steady, with very little variation within the minimum and the maximum price respectively. Tuberose has a yearlong demand as a decorative flower with an added quality of enigmatic fragrance. The calendar year for this flower is spread over the seven months from July to January with maximum production during the last four months.

TABLE VIII
MINIMUM & MAXIMUM PRICE OF FLOWERS, 2010

Flowers		Rose Rs./dozens		
		Min	Max	Average
1	January	20	45	32.5
2	February	25	48	36.5
3	March	20	45	32.5
4	April	20	42	31
5	May	15	35	25
6	June	15	30	22.5
7	July	15	40	27.5
8	August	12	30	21
9	September	12	30	21
10	October	12	30	21
11	November	20	35	27.5
12	December	25	35	30

TABLE IX
MINIMUM & MAXIMUM PRICE OF FLOWERS, 2010

Flowers		Gladiolus Rs./dozen		
		Min	Max	Average
1	January	25	70	47.5
2	February	30	70	50
3	March	25	70	47.5
4	April	25	60	42.5
5	May	25	55	40
6	June	20	45	32.5
7	July	20	55	37.5
8	August	20	45	32.5
9	September	20	55	37.5
10	October	25	45	30
11	November	30	60	45
12	December	30	60	45

TABLE X
MINIMUM & MAXIMUM PRICE OF FLOWERS, 2010

Flowers		Tuberose Rs./dozen		
		Min	Max	Average
1	January	15	40	27.5
2	February	15	40	27.5
3	March	15	36	25.5
4	April	10	36	23
5	May	10	30	20
6	June	10	30	20
7	July	15	40	32.5
8	August	10	36	28
9	September	10	40	25
10	October	15	36	25.5
11	November	15	40	27.5
12	December	15	40	27.5

D. Marketing Margins

The marketing margin fluctuates due to perishable quality of the product, the number and levels of participants in the marketing channel, the marketing service provided, and the risk and uncertainty borne by each of the market participants. In this analysis, the overall marketing margins are computed for four market actors: primary buyers, wholesalers, retailer and consumers. The price paid by the primary buyer is what the producer gets. This buyer encounters additional costs of transporting the commodities from the points of production to the next buyer. In this case, the wholesaler makes a margin and so does the retailer. These prices are actual prices estimated by the wholesalers in the respective areas. The result clearly shows the benefit the producer would get by accessing the terminal market and reducing the marketing channel. The following Table XI summarizes the range of difference between the farm gate price and the retail price for the different flowers. The widest gap between the maximum farm gate price and the retail price is in case of Tuberose.

TABLE XI
DIFFERENCE BETWEEN FARM GATE PRICES AND RETAIL PRICES (Rs)

(Rs./dozen)	Rose	Gladiolus	Tuberose
Farm Gate Prices(Maximum)	70	50	40
Retail Price	80	70	80
Difference	10	20	40

A systematic analysis is done in the following table to account for the difference in the prices. Since flowers are perishable products and since packaging is very rudimentary, a certain amount of loss is always anticipated by the retailers

who incorporate it within the price. Payments to local Mahajan, Panchayat and Bazar Samity are mandatory payments that have to be made for every product. These rates however vary for different months.

TABLE XII
PRICE SPREAD OVER FARM GATE PRICES AND RETAIL PRICE (RS)

	Rose (Rs./dozen)	% Share to Total
Accepted Loss	0.50	5
Local Mahajan Trader outside Bazar Samity	0.20	2
Panchayat Chungi	1	10
Entry Tax at bazar samity	0.25	2.5
Gunny bags & Other Packaging Materials	0.50	5
Transportation	1	10
Labour	1	10
Retailer	5.55	55
Wholesaler	--	--
Total	10	100

Packaging, transport and labour takes up very small share of the price difference mostly because retailers do not have to carry the flowers too far and the means of travel is very cheap. It is when the wholesalers are buying the product and transporting it to a different state that the cost of transport becomes important. As a result the share of wholesalers is the highest.

TABLE XIII
PRICE SPREAD OVER FARM GATE PRICES AND RETAIL PRICE (RS)

	Gladiolus (Rs./dozen)	% Share to Total
Accepted Loss	2	10
Local Mahajan Trader outside Bazar Samity	0.25	1
Panchayat Chungi	2	10
Entry Tax at bazar samity	0.25	1
Gunny bags & Other Packaging Materials	1	5
Transportation	1	5
Labour	1	5
Retailer	4	20
Wholesaler	8.50	42
Total	10	100

TABLE XIV
PRICE SPREAD OVER FARM GATE PRICES AND RETAIL PRICE (RS)

	Tuberose (Rs./dozen)	% Share to Total
Accepted Loss	4	10
Local Mahajan Trader outside Bazar Samity	0.25	--
Panchayat Chungi	1	2
Entry Tax at bazar samity	0.25	--
Gunny bags & Other Packaging Materials	0.25	--
Transportation	1	2
Labour	1	2
Retailer	5	12
Wholesaler	27.25	68
Total	10	100

In case of flowers that are sold by the dozen the wholesaler picks and chooses so a certain percentage of loss is also suffered by the retailer who is supplying the product. The margin with the minimum farm gate price and the retail price

on the other hand is very large. The farmers really stand to lose if the wholesalers can convince them to sell at the minimum price and they themselves reap the benefit of the high retail price. The farmers therefore work hard but are poorly rewarded. He receives less than a fifth of the high price that the consumer pays, compared to over a third in countries such as Thailand and the USA. The lion's share is thus enjoyed by the long chain of assorted middlemen, transporters, wholesalers, and retailers who bring the produce from farm to market.

V. REVENUE OF THE FARMERS

During the survey it was observed that the flower production has both low and high points. At the beginning of the season the output level per acre was low and so was at the end of the season. During the middle period every flower reached a maximum level of output per acre. The farmers sell their product almost every day and there are no scope of storing and as the blooms perish easily it are not possible to hold stock. The farmers therefore have no specific control on the supply of flower. Again the price behavior as discussed earlier does not follow any specific trend. Both high and low prices occur due to a variation in demand. Changing demand also does not accrue to any specific norms. The best possible explanation about the revenue that can therefore be provided is in terms of the relative elasticities of demand and supply. Taking all these factors in to consideration an exercise has been undertaken here to estimate the crop wise weighted average revenue per acre of all sample beneficiaries and a grand total was obtained which is presented in table below. 80% of the respondent farmers cultivating rose were of the opinion that average revenue corresponding to high price was sufficient enough to cover any losses incurred during the lean period. According to them the high demand for rose during the particular occasions sometimes went beyond their expectation and so did the price. The net revenue earned by individual respondent farmer growing rose is around Rs.62,516/- over a period of six months after covering for the losses in the process.

The price of Gladiolus depends upon the particular variety under consideration. Most of Gladiolus produced in Darjeeling are of high quality and hence command a high price from the retailers. Moreover the Flower Growers of Darjeeling have been raising flowers for a much longer period of time and are more aware of the market situation. This has given them a bargaining power with the Retailers. Also demand for Gladiolus is more or less stable throughout the year with high points during January and February. This flower also has a longer vase life than rose. The developing market for Gladiolus is prompting many farmers in the southern districts of West Bengal to start producing the flower. There is a huge potential of exporting Gladiolus from the state if proper avenues are utilized. At present Gladiolus of West Bengal are finding their way to the different states, especially Delhi and Punjab in North and Karnataka in South. The net earnings of the respondent flower growers is estimated around Rs.1,392,86/- in a season which spans over a period of one

year on the average.

TABLE XV

FLOWER WISE ABSOLUTE AVERAGE REVENUE AT FARM GATE PRICE			
Rose			
Price-Quantity Combination*	Average Revenue (Rs)	Average Cost (Rs)	Average Income (Rs)
A	2410	7022	-4612
B	20241	7022	13219
C	7229	7022	207
D	60723	7022	53701
Net Average Income			62516

TABLE XVI

FLOWER WISE ABSOLUTE AVERAGE REVENUE AT FARM GATE PRICE			
Gladiolus			
Price- Quantity Combination*	Average Revenue (Rs)	Average Cost (Rs)	Average Income (Rs)
A	350	3204	-2854
B	25000	3204	21796
C	1750	3204	-1454
D	125000	3204	121796
Net Average Income			139286

TABLE XVII

FLOWER WISE ABSOLUTE AVERAGE REVENUE AT FARM GATE PRICE			
Tuberose			
Price-Quantity Combination*	Average Revenue (Rs)	Average Cost (Rs)	Average Income (Rs)
A	271	2890	-2619
B	10542	2890	7652
C	1084	2890	-1806
D	42169	2890	39279
Net Average Income			42505

A is the revenue due to Low Price x Low Quantity B is the revenue due to Low Price x High Quantity C is the revenue due to High Price x Low Quantity D is the revenue due to High Price x High Quantity

Tuberose sold as cut flowers is mostly of the double variety. This double variety of Tuberose from West Bengal is actually of better quality than the rest of the producer states. According to the respondent farmers the double variety fetches reasonable high price throughout. It is the price of the single variety that fluctuates most and often this variety of Tuberose are sold as loose flowers at the end of the day. The farmers of North 24 Parganas were producing a very good quality of the flower which has a tremendous export potential. The net earnings of each respondent farmer from Tuberose is estimated to be Rs.42,505/- in a season spreading over a period of six months.

A. Net Increment Revenue

One very important factor that affects the calculation of incremental income in case of flower cultivation is that 85% of the respondent farmers grow different flowers at a particular point of time, especially during the period between October to April. Therefore if they suffer due to lean period in case of one flower the loss is covered by the net income from other flowers. For example respondent farmers in the district of North 24 Parganas who cultivate Tuberose during the entire year also grow seasonal flowers during winter. In Darjeeling farmers growing Gladiolus also grow variety of Orchids. Though this production is done in a very small scale, Orchids

fetch a very high price and adds to the farmers' net income. Almost all of the respondent farmers cultivate paddy on plots of land not utilized for flower. Some of them, especially in Jalpaiguri and Nadia also cultivate Jute. Vegetable is also grown in between flower production by some respondent farmers on a very small scale. The survey reveals that these farmers essentially cultivate paddy for home consumption at present. Formerly, as per Agricultural Census, Government of West Bengal, [1], however they were cultivating paddy on the entire land area. The shift in favour of flowers has occurred in the recent years on account of the fact that there has been a tremendous fragmentation of land holding. As a result one particular farmer has two or three small plots of land scattered over the block one of which may be high land and another a low land. Paddy cultivation under such circumstances become very complicated. Moreover there has been a slight decline in the productivity and yield per hectare has gone down reducing the farmers net income from paddy cultivation.

Different varieties of flowers on the other hand can be easily grown on small plots of land without much hassle. Flowers assure farmers of continuity in revenue. All respondent farmers reported a three to four times increase in income due to growing flower in lieu of paddy. An exercise has been carried out to estimate the net increase in the farmers' income by imputing the income from paddy had they concentrated only in paddy production. In the following Table XVIII an effort has been made to estimate the incremental income of the respondent farmers due to shift from paddy cultivation to flower. The entire exercise has been done with the response of the farmers regarding their income from paddy. According to them productivity of rice per acre is around 2070 kg in case of Aman paddy and 2250kg in case of Boro paddy. They complained that farm gate price was always very low and ranged between Rs.8/Kg to Rs.12/Kg. The retail price per quintal of paddy has been verified with the price list of the year. Moreover the land size of 65% of the respondent farmers was much below one acre and that too in fragments. The variations in income from paddy were the highest in case of Darjeeling as farmers hardly produce rice. The alternative crop in case of Darjeeling is Tea, which is under large scale production by Tea estates.

Small and marginal farmers are in no way involved in it. In Jalpaiguri also the alternative crop in case of small farmers is Jute which is also a very poor revenue earner. It is evident from the table below that the revenue inflow has increased substantially when the farmers opted for flowers instead of paddy. The cut flowers are the major revenue earners of which Gladiolus is the most remunerative product. The gross revenue appreciated by 572% and 395% on an average in comparison to Aman and Boro paddy respectively. This is followed by Rose, where the figures are 202% and 122% respectively. Revenue in case of Tuberose has gone up by 105% and 51% on the average. Unlike paddy, flower is a high value crop. If the consumer market can be properly exploited then the revenue earned by the farmers can be increased substantially. The survey showed that about 70% respondent farmers earn around Rs.5000/- per month, 17% earn around Rs.5000/- to

Rs.7500/- per month and about 10% earn around Rs.10,000/- per month and finally 3% of the respondent farmers earn above Rs.10,000/- per month.

TABLE XVIII
NET INCREMENTAL REVENUE (RS)

Flowers	Flower Income	Average Paddy Income (Aman)	Absolute Change (w.r.t Aman)	% Change
Rose	62516	20700	41816	202
Gladiolus	139286	20700	118586	572
Tuberose	42505	20700	21805	105

TABLE XIX
NET INCREMENTAL REVENUE (RS)

Flowers	Flower Income	Average Paddy Income (Boro)	Absolute Change (w.r.t Boro)	% Change
Rose	62516	28125	41816	122
Gladiolus	139286	28125	118586	395
Tuberose	42505	28125	21805	51

B. Internal Rate of Return

The internal rate of return (IRR) [4] is a rate of return used in capital budgeting to measure and compare the profitability of investments. It is also called the discounted cash flow rate of return (DCFRROR) or simply the rate of return (ROR). It is commonly used to evaluate the desirability of investments or projects. The higher a project's internal rate of return, the more desirable it is to undertake the project. Assuming all other factors are equal among the various projects, the project with the highest IRR would probably be considered the best and undertaken first. The idea that better investments have higher internal rates of return is appropriate for comparing investments that have their costs first and their positive incomes later, and which have about the same initial costs. This is so in case of all the three flowers taken into consideration. Risk can complicate the comparison of investments. The farmers are shifting from paddy cultivation to flowers. Since both are agricultural products both have almost similar risk element. The IRR in case of paddy for the small and marginal farmers usually range between 50% to 100%.

An exercise has been carried out here to evaluate the IRR in terms of each farmer in case of production of Rose, Gladiolus and Tuberose. The results as depicted in the figures show that the IRR is considerably high in all the three cases and the return is greater than the established minimum acceptable rate of return or cost of capital. In case of Rose farmers the return is quite consistent for about 75% of the respondent farmers and it ranges between 100% and 200%. Not only is the cost of capital well covered, the rate is way above the established minimum. The respondent farmers of Howrah and Purba Medinipur are the largest gainers in terms of rose cultivation. About 25% of the farmers have rate of return lower than 50%. These farmers are mostly those whose land size is so small and consequently amount of output is so less that they cannot reap the benefit of the price improvement like the others. The rate of return is even higher in case of Gladiolus. In fact for the two large farmers of Kalimpong with largest production

the rate of return is as high as 450%. For the rest, the average rate of return ranges between 150% and 300%. This is considerably a lucrative investment project and the gains of the farmers are substantial. The major respondent producers of Gladiolus are from Kalimpong and Mirik and their land size are more or less similar and hence they supply similar quantities every day.

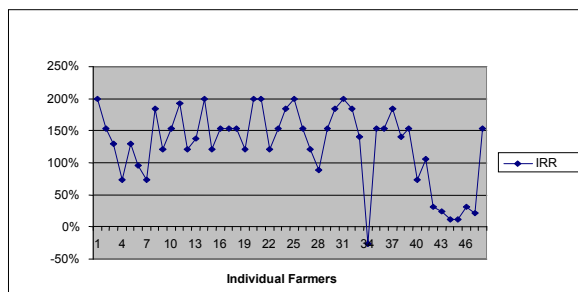


Fig. 1 Rose

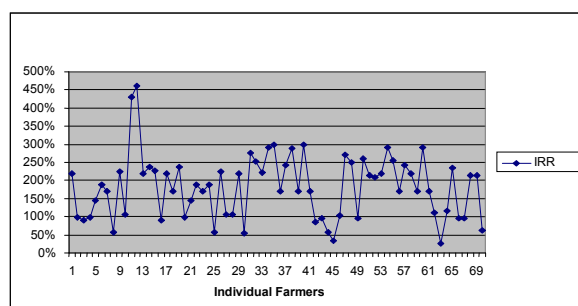


Fig. 2 Gladiolus

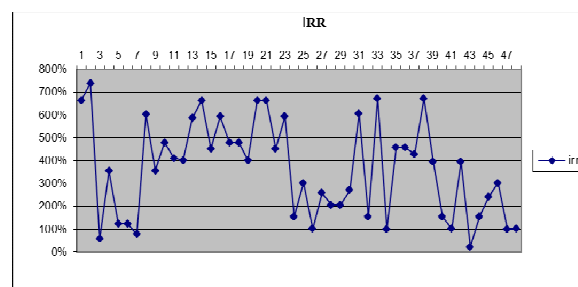


Fig. 3 Tuberose

The case of Tuberose farmers is quite exceptional in the sense that the highest return is close to 700% for five selected farmers of North 24 Parganas who avail the opportunity of exporting the flowers. Tuberose, especially the double variety is a flower very unique to this area and as a result has a tremendous market. Of all the respondent farmers producing Tuberose majority were happy with the high gains.

Moreover, the incremental income excluding the imputed value of family labour increases the revenue further. However, as observed during the survey flower cultivation in different districts and for different types have different requirements. As compared to paddy cultivation the nature of requirement of

labour by the flower growers is much less but has continuity. Especially in the case of high value flowers like Gladiolus the need for labour is very small and is supplemented by family labour mostly. There has thus been an emergence of entrepreneurship in the hills amongst the farmers who utilize their own resources in the process of production. They are utilizing their own land, however small it might be, they are working themselves from plantation to harvesting and are using their own fund as their working capital. The net incremental income excluding imputed value of family labour is therefore much higher for them.

VI. CONCLUSION

Horticulture production gives an opportunity for intensive production and increases small and marginal holder farmers' participation in the market. The respondent farmers mostly have converted themselves from paddy cultivators to flower growers. All of them were of the opinion that the return was much higher in case of flower, in some cases more than three times. Despite the fact that trend in price of the flowers have no definite pattern even as to the variation in their prices and the market is not organized, the flower growers reap a higher benefit. The marketing margins fluctuates due to perishable quality of the product, the number and levels of participants in the marketing channel, the marketing service provided, and the risk and uncertainty borne by each of the market participants. On an average the retailers price varies between one-and-a half times to four times more than the farm gate price. The farmers therefore are not in a position to reap the entire benefit from marketing, the lion's share are taken away by the marketing agents. In spite of this a farmer wise analysis show that the IRR is considerably high in all the three cases and the return is greater than the established minimum acceptable rate of return or cost of capital.

Therefore it is critical to maximize these opportunities and solve the problems that are restricting the growth of this sub-sector and pave the path for development of the small and marginal farmers in the state. It is necessary to bring professionalism in market management, networking of markets and quality assurance. This would need strategic marketing approach having backward and forward linkages coupled with horizontal and vertical integration. By providing sufficient attention and support, attaining the goal of reliable production of high-quality product consistent in quantities could be attained. Resultantly, the flower sector of the state could soon become a major player in the region as well as in Global flower market. Cooperation and commitment, in terms of education, research, funding and communication among the farmers would be a driving force for them to become a leader of commercial floriculture worldwide, in years to come.

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